DOCUMENT RESUME

ED 348 508 CE 061 726

AUTHOR	Stanzani, Claudio
TITLE	Occupational and Qualification Structures in the Field of Environmental Protection in the Metal and Chemical Industries in Italy.
INSTITUTION	European Centre for the Development of Vocational Training, Berlin (Germany).
REPORT NO	ISBN-92-826-2881-7
PUB DATE	92
NOTE	89p.
AVAILABLE FROM	UNIPUB, 4661-F Assembly Drive, Lanham, MD 20706-4391 (Catalogue No. HX-71-91-243-EN-C).
PUB TYPE	Reports - Research/Technical (143)
EDRS PRICE	MF01/PC04 Plus Postage.
DESCRIPTORS	*Chemical Industry; Conservation (Environment); Ecology; Environmental Education; *Environmental Standards; Environmental Technicians; Foreign Countries; *Job Analysis; Job Skills; *Metal Industry; *Occupational Information; Occupations; Pollution; Surveys
IDENTIFIERS	*Environmental Protection; *Italy

ABSTRACT

This report provides an initial analysis of the occupational and qualification structures in the field of environmental protection in the Italian metal and chemical industries. The first two chapters review the legislative background, situation in industry, and provision of environmental education and training. The third chapter presents results of a survey of 10 firms to identify occupations associated with environmental protection and to determine their characteristics. Summaries are provided of an analysis of responses from seven companies in the chemical industry and three in the metal and iron and steel industries. Each case study includes the following: a narrative summary; a chart indicating occupation, percent of working time devoted to environmental activities, and qualifications; and a table that summarizes the principal characteristics of the occupations and indicates the principal tasks, skills, and training requirements. The fourth chapter sets forth conclusions. It identifies "groups of activities" and lists the related tasks for each group. An analysis of occupations groups them into three types: managerial, technical, and operational. A table illustrates criteria for the description and classification of the occupations. Then, the occupations identified in the case studies are classified on the basis of these analyses. A list of the occupations indicates the degree to which each can be assigned to one of the three types. The survey instrument is appended. (YLB)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED348508

CEDEFOP Document

Occupational and qualification structures in the field of environmental protection in the metal and chemical industries in Italy

European Centre for the Development of Vocational Training

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

☑ This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

C. Politi

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

CE061726

BEST COPY AVAILABLE

CEDEFOP Document

Occupational and qualification structures in the field of environmental protection in the metal and chemical industries in Italy

by Claudio Stanzani

First edition, Berlin 1992

Published by:

CEDEFOP — European Centre for the Development of Vocational Training
Jean Monnet House, Bundesallee 22, **D-W-1000 Berlin 15**
Tel. (030) 88 41 20; Fax (030) 88 41 22 22;
Telex 184 163 eucen d

The Centre was established by Regulation (EEC) No 337/75 of the Council of the European Communities

Cataloguing data can be found at the end of this publication

Luxembourg: Office for Official Publications of the European Communities, 1992

ISBN 92-826-2881-7

Catalogue number: HX-71-91-243-EN-C

Articles and texts appearing in this document may be reproduced freely in whole or in part providing their source is mentioned.

Printed in Belgium

Preface by CEDEFOP

One of CEDEFOP's main tasks is to cooperate with the Commission of the European Communities in carrying out national and comparative studies of existing and emerging occupational and qualification structures within certain groups of occupations in the most important of the Member States' industrial, trade and service sectors. The findings of these studies are being used to compile an inventory of occupational and qualification structures relevant to the labour market, which is intended both to increase the transparency of the qualifications that will be needed in a future European labour market and to form the basis for the design or updating of initial and continuing training curricula.

These studies also focus on the emergence of or changes in occupational and qualification structures as a result of measures taken in all leading sectors of the economy to protect the environment, especially as all the relevant forecasts indicate that the demand for specific qualifications in the field of environmental protection will increase significantly in the European Community in the next few years.

However, as it would be beyond the scope of the overall project for all the industries examined by CEDEFOP to be made the subject of separate studies aimed at identifying occupational and qualification structures relevant to the environment, we have begun by selecting two sectors in which the protection of the environment is becoming a special challenge: the metal and chemical industries. Our next step will be to extend this research to the public services.

Studies of the metal and chemical industries, which have now been completed, were commissioned in four Member States (Italy, the Netherlands, the Federal Republic of Germany and the United Kingdom). Despite the very short time allowed and financial restrictions imposed by CEDEFOP, which did not permit a representative approach, these studies reveal a wealth of different, yet comparable, findings on changes in occupational

and qualification structures and the emergence of new, environmental occupations.

This has required considerable personal commitment on the part of the authors, and we would like to take this opportunity to thank them for their efforts.

The findings of these studies will be summarized in a report containing comparative tables of the most relevant occupational and qualification structures in the four countries. It will be published in late 1991 (in English, German and French).

Finally, where they have access to appropriate research findings, the Member States which have not participated in this project are urged to draw up reports on occupational and qualification structures in the field of environmental protection in the same industries in their own countries, adopting the same approach as in this and the other studies.

Enrique Retuerto de la Torre
Deputy Director

Gesa Chomé
Project Coordinator

INDEX

PREFACE 1

CHAPTER I - Environmental and industrial legislation in Italy

1 The current legal situation regarding environmental and ecological questions 2

1.1 Waste products 2
1.2 Environmental effects 3
1.3 Major hazards 3
1.4 Atmospheric pollution 4
1.5 Water pollution 4

2 Changes in the metal & chemical industries resulting from environmental protection measures 5

2.1 The chemical industry 5
2.2 The iron & steel industry 6

3 Occupations in the field of environmental protection: groups of activities 8

CHAPTER II - Enviromental education and training in Italy

1 Environmental education in schools 10
2 Training for specific occupations 12

CHAPTER III - Occupations in the metal and chemical industries: ten case studies

1 Methodology 13
2 Case studies 14

CHAPTER IV - Conclusions

1 The groups of activities 38
2 Analysis of occupations 40
3 Classification of occupations identified in the survey 43
4 Career development 61

ANNEX - Survey questionnaire

PREFACE

The present study, prepared for CEDEFOP, provides an initial analysis of the occupational and qualification structures in the field of environmental protection in the Italian metal and chemical industries.

The first two chapters briefly review the legislative background, the situation in industry and the provision of environmental education and training.

The third chapter sets out the results of a survey covering ten firms, designed to identify occupations associated with environmental protection and determine their characteristics.

The fourth chapter sets out the conclusions of the study. On the basis of an analysis of the case studies, and bearing in mind the limits of the sample (described below), we have listed the occupations involved in environmental protection in the metal and chemical industries.

For each of these occupations the related tasks, skills and educational requirements are specified. We have also attempted to generalize the results obtained, by:

- identifying "groups of activities",
- listing the related tasks for each group,
- identifying types of occupations,
- giving examples of career development.

The survey questionnaire used for the case studies is reproduced in the annex.

Dr Mario Gatti, a member of the ISFOL (Institute for the Development of Vocational Training for Workers) research staff, took part in the preparation of this study; in particular, he was responsible for drafting the second chapter.

Sincere thanks are expressed to Dr Gatti and to Patrizia Martinelli, Virgilio Mannocci and Giuseppe Baffert, members of the SINDNOVA research staff.

CHAPTER I

ENVIRONMENTAL AND INDUSTRIAL LEGISLATION IN ITALY

1. The current legal situation regarding environmental and ecological questions

In Italy, environmental protection legislation has only been developed fairly recently.

On the initiative of the Government, since the beginning of the 1980s the legislature has adopted a series of basic provisions designed to protect the environment and the population by identifying sources of industrial pollution.

Many of these provisions were introduced in accordance with EEC directives.

Law No 349 of 1986 established the Ministry for the Environment, stipulating that its task is to coordinate all policies and initiatives aimed at the promotion of environmental and ecological protection and surveillance. The Ministry acts through the public health services of the Local Health Units (USL), which come under the local authorities, the fire service and the civil defence organization.

In each district the Mayor is the highest authority with regard to the issue of licences and permits in respect of industrial activities or energy production, which are accorded bearing in mind the need to protect the environment and the population.

The regional authorities are responsible for programming and planning within their respective territories.

A summary of Italian environmental protection legislation is given below.

1.1 Waste products

The basic instrument applying to industrial waste products is Decree 915|82, which was followed by a series of implementing or interpretative laws: e.g., Law No 441 of 29.10.87 (Provisions governing the disposal of waste products), Law No 475 of 9.11.88 (Provisions governing the disposal of industrial waste products), and Law No 45 of 10.2.89 (provisions governing emergencies arising in connection with the disposal of industrial waste products).

Responsibility for evaluating the environmental effects caused by waste disposal installations, which was entrusted to the regions before the issue of Decree 915, has been restored to the Ministry for the Environment under Law No 475.

More recent measures include the following:

- the establishment of "exchanges" for secondary materials and by-products, run by the Chambers of Commerce and promoted by the Ministries of Industry and the Environment;

- the establishment of a register of special wastes and toxic and dangerous substances, including certain types of urban refuse, to enable the preparation of data banks on waste production and disposal at regional level.

1.2 Environmental effects

The 1985 EEC Directive on the assessment of environmental effects was incorporated into national law under Law 349|1986 (establishing the Ministry of the Environment), Decree No 377 of 10.8.88 regulating decisions regarding environmental compatibility, and the Decree of 27.12.88 laying down technical standards for the study of environmental effects and the issue of opinions regarding environmental compatibility.

This legislation concerns the environmental effects - i.e., the effect on man, flora and fauna, the soil, water, air, etc. - of public and private projects and infrastructures. Of major significance, it is designed to supersede the earlier legislative philosophy based on the concept of compensation, and seeks to acquire knowledge and control from the planning phase of hazards inferable from environmental compatibility opinions and assessments.

1.3 Major hazards

EEC Directive 501|82 - better known as the "SEVESO" Directive, since it was introduced in the wake of the accident at the ICMESA plant in 1976 - was incorporated into Italian law by Decree 175|1988. This law establishes the principle that industries using dangerous substances or technologies may operate in Italy on condition that they adopt effective precautions and security measures to reduce to a minimum the possibility of dangerous accidents and ensure that such incidents are kept under strict control if they occur. Another aspect of this law is that the owner of the plant is held to be fully responsible and is considered to be conversant with the production processes and substances employed, being liable to penalties under criminal law in the event of total or partial failure to comply with the relevant legislative provisions; responsibility in this matter can under no circumstances be delegated.

The Ministry of the Environment, in agreement with the Ministries of Industry and Health, exercises broad administrative and supervisory powers with respect to the major hazards; in particular, the Ministry has set up a group of "super inspectors", with broad police powers.

1.4 Atmospheric pollution

Under Decree No 203 of 24.5.88 the provisions of four Community directives relating to the protection of the population against atmospheric pollution were incorporated into Italian law; they concern, respectively, permitted and recommended concentrations for sulphur dioxide and suspended particulates, the permitted concentration for lead, atmospheric pollution caused by industry, and standards for nitrogen dioxide.

This Decree fills the gaps in the legislation which were left uncovered by the so-called "anti-smog" law of 1966.

The Decree contains significant new provisions: it is valid throughout the national territory, unlike the earlier anti-smog law which applied only to certain areas; the entrepreneur is obliged to submit notification of any potential hazards together with an emission control plan, which must be respected; monitoring arrangements are provided for which enable direct participation by the public and the environmental protection associations.

Considerable difficulty has been met with up to the present, however, in applying these provisions, mainly owing to delays on the part of the Government and local authorities.

1.5 Water pollution

Community directives on drinking water, water intended for human consumption, and the quality of bathing water have been incorporated into Italian law by Decrees 515|82, 236|88 and 470|82 respectively. However, no legislation has yet been adopted in conformity with EEC rules regarding water used for pisciculture, underground waters and limit values for mercury discharges from the chloro-alkali electrolysis industry.

These gaps in Italian legislation are by no means insignificant; however, the most important concerns industrial pollution, which up to now has been governed by Law 319|76, better known as the "Merli" law. In this case also we can only point to the regrettable inadequacy of the structures and institutions entrusted with the tasks of supervision and control provided for under this law.

The organizational and technical inadequacies of the local bodies concerned - especially the Local Health Units (USL) - combined with the unwillingness of industrialists to respect the limits laid down for the emission of pollutants (despite the numerous deferments granted by the legislature) has effectively shelved a law which in the 1970s had raised many hopes for the reclamation of waters polluted by industrial waste. Today, a radical revision of the "Merli" law is being planned, and the introduction of "water quality objectives" is under discussion, to replace the former prohibitions and maximum permitted values.

2. Changes in the metal and chemical industries resulting from environmental protection measures

At present, Italian industry is in a transitional phase under the influence of certain factors at both national and international level:

- the internationalization of rules and standards;
- environmental emergency situations, especially those concerning emissions and waste products;
- technological changes to plant and restrictions applying to the most dangerous;
- the changing attitude (greater vigilance) of the population, trade unions and environmental protection associations.

2.1 The chemical industry

The chemical industry is concerned with the production of basic organic and inorganic chemicals and their derivatives, organic derivatives of petrochemicals, synthetic resins and elastomers, fertilizers and plant protection products, pharmaceuticals and detergents.

The Italian chemical industry accounts for 11% of the country's total industrial production (coming third after the metal and extractive industries) and 14% of total EEC chemicals production (the fourth largest). The leading combine - Montedison - accounts for 10% of total production in the sector (its average production in the period 1980-87 was 24 million tonnes).

The environmental impact of the Italian chemical industry must be considered significant. 10-15% of the raw materials processed are discharged as waste products; if the dispersion of production sites and the efficiency of the average plant is taken into account, however, the proportion of waste products may be estimated at around 20%.

Atmospheric pollution is another particularly widespread hazard, due to processes involving combustion (gases, sulphur and nitrogen oxides and volatile organic and inorganic substances), and the production of powders such as fertilizers, detergents, etc. Another problem concerns the emission of organic halogen compounds, heavy metals and hydrocarbons, all of which are serious atmospheric pollutants, causing damage to the ozone layer and creating a source of photochemical smog. The extent of these emissions depends mainly on the existence - and efficiency - of filtering installations.

Liquid effluents mainly concern the following:

- cooling water, of which 60% is once-used seawater and 40% surface water, generally recycled;
- water used in production processes and cleaning, which amounts to 5-10% of the volume of cooling water;

- consumption: about 150-200 million m3 of cooling water require treatment before being returned to water resources.

Adding the water used in processing we arrive at a total annual consumption of 700-1 000 million m3, which corresponds to 2% of overall national water resources. However, the disposal capacity for water used in processing does not exceed 100 million m3 per annum, according to estimates relating to the major firms only.

Chemical industry waste products concern:

- special wastes: 3-5 million tonnes per annum (including 1 million tonnes of phosphorus compounds);

- toxic and injurious wastes, 300 000 - 1 million tonnes per annum;

- total: an estimated 5-10 million tonnes per annum.

Existing waste disposal capacity (including recycling, incineration and dumping) is considered to be inadequate, especially as regards toxic and injurious wastes.

In the chemical industry, which arouses the deepest anxieties and the sharpest criticism on environmental and ecological grounds, solutions are being sought primarily in three directions:

- clean technologies,

- waste minimization,

- the treatment, disposal and recycling of waste products.

At present, the greatest efforts are being concentrated on the third aspect, since it is the most directly affected by legislation regarding emission control, waste disposal, etc.

All in all, despite some notable achievements, the situation remains critical in view of the fact that a high percentage of chemical industry wastes - including toxic and injurious wastes - are still disposed of improperly.

2.2 The iron and steel industry

The iron and steel industry is concerned with the production of cast iron ingots, raw steel, ferro-alloys, rolled sections, other finished products, iron castings for various purposes, etc.

The major public sector establishments in this industry are located in Bagnoli, Cornigliano, Piombino, Taranto and Terni, while the private sector establishments are mainly concentrated in the north of the country.

The principal problems as regards pollution arise from the industry's use of considerable quantities of water: consumption varies from 5-10 m3 per tonne produced of recycled water to 100-200 m3|tonne of once-used water. This indicates a total annual consumption of 300-600 million tonnes, taking recycled water alone; the bulk of this water (95-97%) contains toxic substances in suspension or emulsified. However, technological advances have substantially reduced effluent contamination at various stages in the production process. The following are examples:

- sintering: dust elimination, either by a dry process or using water in sealed circuit;

- pickling: the recycling of exhausted acid baths and washing water is now a widely used technique;

- steel production from pig iron, which involves the use of 5-20 m3 of water per tonne produced: concentrations of calcium carbonate, iron and iron oxides, aluminium, magnesium and manganese particulates in suspension have been reduced to an average of 15-30 kg per tonne produced; however, further reductions are possible.

On the other hand, the pollutant levels resulting from hot and cold rolling processes are still high, producing respectively 50 000-70 000 tonnes of materials in suspension in water and 0.2-0.5 kg|m3 of suspended and emulsified solids.

Smelting and blast furnace slags account for the greater part of the solid wastes produced by the iron and steel industry (120-150 kg per tonne of production, giving a total of 2.5-3 million tonnes per annum); only part of this material (20-30%) is recycled or used in the brickmaking, glass-making or road building industries. The remainder, about 2 million tonnes per annum, is disposed of as waste.

Waste in the form of dusts and sludge consists essentially of iron, carbon, silicon, calcium and magnesium, in addition to other more dangerous elements such as lead, cadmium and chrome.

These wastes originate from blast furnaces, sintering and steel production.

Apart from mineral and metallic dusts, the main atmospheric pollutants are sulphur dioxide, nitrogen oxide and mixtures containing gases such as carbon monoxide or dioxide.

Despite the efforts made, environmental problems are still acute and the iron and steel industry is still far from being able to guarantee the use of intrinsically clean technologies; on the other hand, it should be noted that while the market tendency for fine and intermediate chemical products is firm, favouring investment, the same cannot be said of the iron and steel industry, which has been in a crisis situation for the past decade, with little prospect of a brighter outlook.

It is of interest to review the principal terms of the agreement signed on 23 July between the Ministry of the Environment and the Managing Director of the ILVA (a major group which is partly State-owned), although it exclusively concerns pollution control measures.

The programme, which will run from 1990 to 1993 at a total cost of LIT 730 billion, relates to all three aspects of the ecosystem: air, water and soil. The implementation of the programme will be entrusted to the Centro Sviluppo Materiali (Materials Development Centre) of the ILVA, with the collaboration of national and foreign institutes. The cost will be borne mainly by the ILVA. However, under the terms of the contract the Government may contribute to the financing from time to time. The plants concerned by the programme are located at Taranto, Piombino and Terni; the following operations are planned:

- Atmospheric pollution: reduction of emissions by 42%, corresponding to 18 000 tonnes per annum, at a cost of LIT 110 billion over the three-year period. Sulphur dioxide emission will be reduced by 90% overall, at a cost of LIT 130 billion, while nitrogen oxide emission is to be reduced by 7% at a cost of LIT 15 billion. A further LIT 140 billion will be devoted to reducing sulphur dioxide emission from coke ovens, for which alternative fuels with a reduced carbon coke content are under study.

- Soil contamination: a drastic reduction (by 35%) in the production of foundry slags is planned, involving an expenditure of LIT 30 billion, of which half will be devoted to the reduction of the volume produced and half to recycling.

- Water pollution: LIT 25 billion will be allocated to water pollution control and a further 130 billion to research and development projects.

3. Occupations in the field of environmental protection: groups of activities

Environmental protection in industry is an area of management devoted to ensuring the protection of the environment, the workers and the population against potential hazards arising from the production processes in use at a particular plant. These hazards relate, in particular, to the following:

. raw materials: their quantities and characteristics, methods of transport and storage;

. intermediate products: their quantities and characteristics, methods of transport and storage;

. the resources used: land, water, etc.;

. solid, liquid and gaseous emissions and waste products, their treatment and|or recycling, transport and disposal;

- finished products: their quantities and characteristics, methods of storage and transport to the intermediate and/or final consumer;

- energy sources;

- risk of injury, e.g. by exposure to noise, ionizing and other radiation, etc., generated by machinery and equipment;

- danger of fire, explosion, etc. (see legislation incorporating the EEC "Seveso" Directive);

- social effects.

This management area is closely connected with another: health and safety at work.

Environmental protection is given effect through a series of specific activities involving a range of occupations and jobs in a developing field.

Within the field of environmental protection certain fundamental groups of activities may be distinguished:

- coordination and planning: environmental protection strategies, preventive measures, management of resources, relations at various levels and compliance with legislative and administrative provisions;

- research and development, innovation and problem-solving;

- pollution control and monitoring;

- checking plant safety, monitoring major hazards, fire prevention;

- adjustment and maintenance;

- waste management.

CHAPTER II

ENVIRONMENTAL EDUCATION AND TRAINING IN ITALY

The emphasis given to the environment and its protection in the Italian education and training system is constantly increasing, as may be seen from the proliferation of educational experiments devoted to this subject.

Current initiatives essentially concern the following lines of action:

- environmental education in schools,
- training for specific occupations.

1. Environmental education in schools

Initiatives in the field of environmental education in schools cover a broad spectrum ranging from extra-curricular seminars to the introduction of this subject into school curricula. For example, new material known as "Scienza della Terra" (Earth Science), which concerns the relationship between man and the environment, has been introduced into the first two years of upper secondary education.

Two comments may be made on these developments:

- environmental questions are gaining an ever more pervasive influence on other disciplines, to the extent that this field is becoming a "horizontal" factor modifying the approach to the study of a whole range of subjects;
- on the other hand, current initiatives regarding environmental education in school are the fruit of efforts by a few enthusiastic teachers who often fail to find the necessary support for their activities in this area.

Taken together, therefore, these initiatives suffer from a structural weakness caused by the absence of any central coordination, making it difficult to profit from the results of the different experiments. Another problem is the lack of refresher training provision for teachers in the area of environmental education.

However, despite the difficulties noted, environmental questions are rapidly acquiring a place in school curricula because they impinge on the teaching of all other disciplines to a greater or lesser extent.

Further, this problem is international in character; many Italian schools took part in the pilot project on environmental education promoted by the EEC from 1977 onwards.

While the fragmentary and experimental character of current projects in this area in schools of every type and level makes it impossible to present a comprehensive catalogue, some examples will be given to indicate what has been achieved in environmental education, especially as regards training for specific occupations.

In the past few years certain industrial trades schools have introduced an experimental course in environmental chemistry designed to qualify students as purification plant technicians.

Other industrial trades technical schools specializing in nuclear energy have, as an experiment, introduced courses in environmental physics into their curricula; it is expected that a new branch will soon be introduced, leading to a diploma as environmental protection expert. The course content is to include natural sciences, chemistry and health physics.

The State vocational training schools, aware of the need for training for environment-related occupations, have introduced three-year basic courses in biotechnology in Rome and Venice.

During the coming school year interdisciplinary environmental material is to be introduced into the three-year courses for chemical and agricultural workers and fitters.

As regards the five-year courses run by the vocational training schools, a qualification as ecological|environmental technician is shortly to be introduced in the chemistry and agricultural sectors.

In response to the challenge of the "green universities" set up by the Italian Ecological Movement (at present more than 100 of these institutions exist, attended by over 20 000 persons), the university institutions are beginning to take account of environmental problems, introducing two types of measures:

- the incorporation into degree courses of examinations connected with the study of environmental problems, for example "landscaping, parks and gardens" at the University of Bologna;

- the introduction of specialized post-graduate courses.

The following are examples of these post-graduate courses:

- landscape engineering and architecture (University of Genoa)

- landscape agronomics (University of Bologna)

- biological and integrated pest control (University of Bologna)

- forestry engineering (University of Trento)

- forestry sciences (Universities of Florence, Padova, Bari, Cosenza, Potenza, Viterbo and Turin)

- ecology (University of Padova)

- environmental biotechnology (University of Genoa)

- environmental technology and chemistry (La Sapienza University, Department of Chemical Engineering, Rome)

- environmental sciences (University of Milan).

The school system comes under the Ministry of Education and therefore has a highly centralized administration; the vocational training system, on the other hand, is run by local bodies (authority in this area is delegated by the regions to the provinces and municipalities), with the result that it has a decentralized decision-making structure able to respond more rapidly and with greater flexibility to labour market requirements and training needs at local level. As a result, a wide range of training courses for environmental occupations is on offer and is contantly being expanded; details of these courses (although not comprehensive) are given in the tables in annex. The first series of tables sets out the typology and level of the courses, the duration and target population; the second series gives an estimate of the number of courses provided, showing a breakdown by region and sector.

2. Training for specific occupations

The nature of the tasks entrusted to personnel responsible for environmental protection in the metal and chemical industries generally requires high-level qualifications (university degree or upper secondary school certificate).

It should also be noted that although a wide range of courses are offered on various aspects of environmental protection (see Annex), training is often organized directly by the firms themselves.

The requirements for occupations involving the exercise of responsibility, whether technical or managerial, include a degree in chemistry, engineering or physics combined with appropraite work experience. Self-instruction is commonly employed to acquire training and refresher training in this area.

For technical occupations (e.g. laboratory analyst or waste disposal|recycling plant operator) the upper secondary technical school leaving certificate is required, plus one year's vocational training and an appropriate period of work experience.

For operators, given the social and national importance of environmental protection, the upper (or more rarely lower) secondary school leaving certificate is generally required, plus one to three years' basic vocational training depending on the particular specialization and the qualifications held.

CHAPTER III

OCCUPATIONS IN THE METAL AND CHEMICAL INDUSTRIES: TEN CASE STUDIES

1. Methodology

A survey was carried out to collect information directly "in the field" regarding the characteristics of occupations in the ecological and environmental protection services of the firms participating.

The firms covered by the survey belong to the metal and chemical sectors and are all located in Piemonte (Piedmont).

This choice was determined by the need for a sample of companies exhibiting significant environmental hazards and sharing a similar cultural, political and administrative context.

The survey was therefore carried out in a region with a long-standing industrial tradition and affected during the past ten years by intensive restructuring measures and technological innovations. Furthermore, Piedmont has a highly unionized workforce and well-organized public structures devoted to public health and the protection of the environment.

Finally, in this region public interest in ecological questions and the improvement of living and working conditions is particularly intense.

Information was obtained through interviews with management staff of the companies participating in the survey; in some cases the establishment's managing director was interviewed, while in others the personnel manager or director of the firm's environmental protection services was selected.

In every case, the data compiled were discussed with the trade union representatives.

In the course of the interviews, which were conducted face to face on the basis of a questionnaire, the objectives of the survey were explained by the interviewer.

BEST COPY AVAILABLE

Structure of the questionnaire (see Annex 2)

Part I Data regarding the firm: location, types of prdouct, markets, number and characteristics (sex, grade, average educational level) of staff, organization chart.

On the basis of the organization chart it was possible to situate occupations associated with environmental protection within the firm's organizational structure.

Part II Data regarding the production process and its associated environmental hazards. On the basis of a description - and reconstruction - of one or more production processes using a flow chart (input (raw materials) - processing - output (finished product)) and other elements derived from the survey it was possible to identify potential environmental hazards (emission of contaminants into the air and water, waste products, etc.) and their effects in the area concerned.

Part III Data on occupations associated with environmental protection. This part of the questionnaire is designed to obtain information regarding the personnel assigned full time or part time to environmental protection activities in relation to the hazards identified.

The following information was sought: the percentage of working time averagely devoted to this field of activity; any contractual provisions relating to the occupation; the tasks, skills and basic training; any refresher training provided for and the levels (1-5) of training activities in relation to the EEC standard classification.

The task of personnel assigned to environmental management activities may be divided into five areas:
- research, innovation and problem-solving,
- control and monitoring,
- adjustment and maintenance,
- treatment and processing,
- relations with outside bodies and administrative and legal matters.

2. Case studies

The case studies relate to the following companies:

Chemical industry

C.1 Production of paints and enamels (Alessandria)
C.2 Processing of copper, production of insulated cords and cables (Asti)
C.3 Manufacture of antibiotics (Turin)
C.4 Petroleum processing (Novara)
C.5 Manufacture of printed circuits (Vercelli)
C.6 Manufacture of fluorides and organic products (Alessandria)
C.7 Tyre manufacture (Turin).

Metal and iron and steel industries

M.1 Manufacture of special and stainless steels (Aosta)
M.2 Manufacture of aluminium products (Turin)
M.3 Manufacture of hot-rolled steel products (Turin).

There follows a summary, case by case, of the data obtained from an analysis of the replies to the questionnaire. Data regarding the occupations identified are set out in the tables annexed to each case study.

Case study C.1

This study concerns a company of which 65% of the capital is held by an American group and the other 35% by an important Italian group.

The company produces paints and enamels for the following industries: motor vehicles, domestic electrical appliances (e.g. refrigerators), railway equipment and electrical equipment. 85% of the production goes to the national and 15% to international markets, in particular Roumania, Bulgaria, Yugoslavia and Turkey.

The company has 449 employees, of whom 60 are women. 238 are manual workers, of whom 80% hold lower secondary and 20% upper secondary education qualifications.

The educational levels of the 174 technicians and white collar workers are as follows: 50% lower secondary and 40% upper secondary, while 10% hold university degrees. There are 28 middle management staff, of whom half are graduates and the remainder certificate holders; the nine members of the upper management staff are almost all graduates.

The company's organization structure includes a specific service: "Health and safety at work and ecological and environmental protection", which is directly responsible to the management.

Nature of hazards. (a) In respect of its resin production (polymerization and heat treatment in pressure vessels) the company is among those covered by Table B of Decree 175|88 (the Seveso Directive); (b) environmental hazards arise from the emission of solvents into the air and the company's water treatment procedures; (c) another hazard concerns the disposal of special, toxic and harmful wastes; and (d) the pigment production process presents a strong risk of fire.

Broadly, the intervewees gave the following assessment regarding the situation and the preventive and safety measures adopted: acceptable situation, dangers under control, dangerous accidents possible only in exceptional conditions.

To meet this situation, the company has a service, referred to above, to which the following personnel are attached.

Occupation	% of working time devoted to environmental activities	Qualifications
One coordinator	100	Chemistry degree
One safety officer	100	Upper secondary school certificate
One industrial health officer	100	"
One waste disposal officer	100	"
Two fire prevention officers (assisted by 28 volunteers)	100	"

These occupations are not defined in the provisions of national or inter-trade agreements regarding occupational profiles, but relate solely to the company's own regulations.

The table below summarizes the principal characteristics of the occupations described; in each case, the principal tasks, skills and training requirements are indicated.

TABLE 1

CASE STUDY C.1. SECTOR: Chemical industry, paint manufacture.

OCCUPATION	TASKS (1)	SKILLS AND COMPETENCES (2)	DENOMINATION (3)	EDUCATION AND TRAINING (4)
1. Coordinator, safety and environmental protection	Coordination of the service. Adaptation of American standards and environmental policies to the Italian context. Ensuring the application of the most restrictive rules.	The following is required for the execution of the assigned tasks under all occupations: a thorough knowledge of the establishment, production processes, substances and technologies employed.	The occupational denominations are as given in the first column; they relate to the firm's own regulations.	1. Degree in chemistry Vocational training: a. internal using manuals and materials provided by firm; b. external; participation in specialized courses and seminars. Type of training: recurrent, theoretical/practical, on-the-job. Duration of courses: variable, averagely 2-3 days. Level (EEC standards): 5.
2. Safety officer	Checking safety measures and evaluating accidents. Checking compliance with legal provisions on ecological protection and waste disposal.		All the occupations listed fall between the seventh and eighth levels of the National Collective Labour Agreement (CCNL).	
3. Health officer	Programming and management of environmental monitoring. Exchange of data with outside bodies.			
4. Waste disposal officer	Maintaining the register regarding the input and disposal of waste products. Controlling storageof waste products to ensure homogeneity and monitoring methods of transport.			2.3.4.5 Upper secondary or industrial trades technical school qualifications Vocational training: a. internal, technical courses and use of audio-visual material; b. external (occasionally). Type of training: theoretical/practical, recurrent, on-the-job. Duration: 2-3 hrs audio-visual, 3 days for technical courses. Levels: 4 and 5 (EEC).
5. Fire prevention officer	Verification of fire-fighting equipment and extinguishers. Training of volunteers.			

1. DESCRIPTION OF TASKS
2. KNOWLEDGE, COMPETENCES AND SKILLS
3. DENOMINATION OF OCCUPATIONS UNDER COLLECTIVE AGREEMENT OR CONTRACT
4. EDUCATION AND TRAINING, LEVELS, ETC.

Case study C.2

This company forms part of an Italian group; the establishment under study is located in the province of Asti. The firm belongs to the chemical sector, and processes copper for the manufacture of insulated cords and cables. Its production is sold on both national and international markets.

The firm has 327 employees, including 143 women; 264 are manual workers, all with lower secondary school certificates, while 47 are white collar workers and technicians, most of whom also hold lower secondary certificates. There are 16 middle management staff, of whom part are holders of upper secondary school qualifications and the remainder are graduates.

No specific environmental protection service is provided for; the company can, however, call on the services of an "Environment and Ecology" Department which is directly responsible to the group's general management. This Department maintains links with the firm's personnel and maintenance departments.

Hazards. Copper processing produces waste products and scrap; used oils are collected by a waste disposal consortium, while copper and rubber scrap and rubber off-cuts are sold.

The manufacture of rubber insulated cables (for PVC cables the drawing process is used) involves the use of cooling water, which is treated before discharge; gaseous emissions from the Banbury mixer and vapours containing oils from energy production are treated before venting. Emissions to atmosphere of polymerization products are minimized.

The establishment falls within the provisions of Decree 203|88 on atmospheric pollution caused by industrial plant; the intervewees assessed the hazard situation as satisfactory, dangerous agents being under control.

As stated above, in respect of environmental questions the firm makes use of an external service directly responsible to the group's general management.

However, certain members of the firm's staff are concerned part-time with environmental questions in collaboration with the service referred to.

Occupation	% of working time devoted to environmental activities	Qualifications
One personnel manager	5	Degree in law
Two plant and maintenance technicians	30	Industrial trades technical school certificate

These posts have no specific denomination under contract or agreement: the two technicians' posts are sixth and seventh level respectively.

The table on the following page summarizes the tasks, skills and training levels relating to the posts referred to.

BEST COPY AVAILABLE

TABLE 2

CASE STUDY C.2 SECTOR: Chemical industry, processing of copper, production of insulated cables

OCCUPATION	TASKS (1)	SKILLS AND COMPETENCES (2)	DENOMINATION (3)	EDUCATION AND TRAINING (4)
1. Personnel manager	Responsible for conformity with all provisions of national, Community and international law. Responsible for relations with outside bodies and the authorities. Calls on the services of the group's department and coordinates all pollution control and safety activities.	Knowledge of production processes and technologies. General knowledge of relevant legislative provisions.	Personnel manager.	Degree in law. Vocational training: a. internal, using group's materials and manuals; b. external: participation in courses meetings and seminars. Type: theoretical, occasional. Duration: variable. Level: 5 (EEC).
2. Plant and maintenance technician	Following changes in legislation and standards in collaboration with the group's Environment and Ecology Department. Monitoring application of rules. Formulating proposals and giving effect to changes.	Specialized technical knowledge and knowledge of relevant provisions.	Technician, sixth or seventh level (CCNL).	Upper secondary school certificate, industrial trades technical school certificate. Vocational training: usually self-instruction. Type: occasional, theoretical. Duration: variable. Level: 3-4 (EEC classification).

1. DESCRIPTION OF TASKS
2. KNOWLEDGE, COMPETENCES AND SKILLS
3. DENOMINATION OF OCCUPATIONS UNDER COLLECTIVE AGREEMENT OR CONTRACT
4. EDUCATION AND TRAINING, LEVELS, ETC.

Case study C.3

This Company, a pharmaceuticals enterprise specializing in the production of antibiotics, is located in the province of Turin and belongs to a major Italian group. 10% of its production goes to the national market, 40% to the EEC and 50% to non-Community countries.

The Company has 630 employees, including 100 women. The 411 manual workers are all holders of the lower secondary school certificate; of the 215 white collar workers and technicians, 40 are graduates, 60 have upper secondary school diplomas, and the remaining 115 have primary school and vocational training qualifications. The 32 middle management staff all have upper secondary school diplomas, while the 4 senior managers are all graduates.

The establishment's management is responsible to the group's central management at its headquarters in Milan. The establishment has its own "Safety and Environmental Management" Service.

Hazards. The principal environmental hazards resulting from antibiotics production concern emissions of malodorous substances (sulphurous by-products, sulphur dioxide, mercaptans) and small quantities of solvents. In addition, large quantities of wastes are produced: sludge from the purification plant, which is disposed of for use in agriculture; fermentation micelles, of which the discharge into the atmosphere is authorized pending a decision by the Ministry of the Environment. The water used is treated on site before discharge.

The situation was judged to be satisfactory by interviewees, who believed the dangers to be modest or rarely arising.

The "Safety and Environmental Management" Service is responsible to the firm's managing director, who devotes about 30% of his time to environmental management activities. Two technicians are assigned full time to this Service, while other personnel from the Quality Control Department and laboratories devote 10-15% of their working time to these activities.

Occupation	% of working time devoted to environmental activities	Qualifications
Managing director	30	Degree in chemistry
Two safety and environmental management technicians	100	Industrial trades technical school certificate
Quality control and monitoring personnel	10	Graduate or certificate holder

The table on the following page sets out the tasks, skills and training levels relating to these occupations.

TABLE 3
CASE STUDY C.3 SECTOR: Pharmaceuticals

OCCUPATION	TASKS (1)	SKILLS AND COMPETENCES (2)	DENOMINATION (3)	EDUCATION AND TRAINING (4)
1. Managing director	Responsible for safety both within the plant and outside. Responsible for relations with other bodies and the public authorities.	Knowledge of all production processes both from the technological and organizational points of view. Knowledge of the area and local environmental effects.	Managing director	Degree in chemistry. Vocational training: courses and updating material provided by group. Attendance at external courses and seminars. Type: recurring, theoretical and practical. Duration: variable. Level: 5 (EEC).
2. Safety and environmental management technician	Monitoring and reporting anomanlies. Empowered to halt production in case of danger. Responsible to the director.	Knowledge of chemistry, biology and technologies.	Technician, 6th and 7th level (CCNL)	Upper secondary school certificate, chemical technician's certificate Vocational training: in-firm training in safety, self-instruction using group's manuals. Specialized outside training courses. Type of training: recurrent, theoretical/practical, on-the-job. Duration: 1-3 days. Level: 4 (EEC classification).

1. DESCRIPTION OF TASKS
2. KNOWLEDGE, COMPETENCES AND SKILLS
3. DENOMINATION OF OCCUPATIONS UNDER COLLECTIVE AGREEMENT OR CONTRACT
4. EDUCATION AND TRAINING, LEVELS, ETC.

Case study C.4

This firm, a petroleum processing concern producing gas, bitumen and solvents from crude oil, belongs to a multinational group and is situated in the province of Novara.

The firm's products go mainly to the national market, though some are exported to Switzerland and a number of EEC countries. The Company has 497 employees, including 22 women. Of the 225 manual workers, 60% hold lower secondary and 40% upper secondary certificates; of the 192 white collar workers and technicians, 60% hold upper secondary and the remaining 40% lower secondary certificates. There are 80 middle management staff, of whom 60% are graduates (primarily in chemistry and engineering), while the remainder hold upper secondary school certificates.

The group has an international advisory staff for environmental problems; the corresponding structure in Italy consists of technicians attached to the firm and outside advisers. This structure is responsible to one of the group's vice-presidents. In addition, the firm is a participant in a company specializing in the provision of advice on environmental problems.

Within the firm, the Technical Division is responsible for environmental questions, while the Personnel Department is responsible for health and safety at work.

Hazards. The firm's operations involve a number of hazards connected with the transport of the raw material (crude oil) and finished products (gas, bitumen and solvents), storage, the various processing stages and the disposal of the resulting wastes.

In particular, crude oil arrives by pipeline, which must be constantly checked both manually and using automated equipment to determine its state of wear and prevent leakages; regular police patrols are also required, in case of possible sabotage.

The storage facilities and distillation plant are located at a safe distance from dwellings and are the subject of constant monitoring and maintenance. Energy for the distillation process is obtained using 90% methane and 10% combustible oils; this reduces sulphur dioxide emission by 50%.

Waste water is collected by an internal drainage system and discharged via a treatment plant to prevent contamination by hydrocarbons. An underground conduit leading to the river Ticino is under construction.

Sludge produced by equipment cleaning operations is treated in accordance with the law; other waste products include spent catalysers, which are exported off-site for metal recovery or discharged as inert, and caustic soda, which is the most toxic.

The Company is among the high-risk firms covered by Table A of Decree 175|88 (the Seveso Directive).

The accident hazard situation was considered by the technicians interviewed to be satisfactory and under control.

All the posts concerned with environmental protection in the firm correspond to CCNL levels 8-11. The most important - and highly qualified - is the pollution adviser, who is responsible for all monitoring, checking, maintenance and waste treatment activities. He is empowered to employ the services of outside bodies or personnel from the Technical Division.

Relations with the public authorities and the group are the responsibility of the general manager and the director for outside relations.

Occupation	% of working time devoted to environmental activities	Qualifications
One pollution adviser	100	Upper secondary technical school certificate (chemical technician)
One general manager	20	Degree in chemistry
One director (outside relations)	80	Degree in law
Technical Division personnel	50-60	Upper or lower secondary school certificate

In addition to the foregoing, the firm has a full-time health and safety officer.

The table on the following page sets out the principal tasks, skills and other characteristics of the pollution adviser.

TABLE 4

CASE STUDY C.4 SECTOR: Chemical industry, petroleum processing

OCCUPATION	TASKS	SKILLS AND COMPETENCES	DENOMINATION	EDUCATION AND TRAINING
	(1)	(2)	(3)	(4)
Pollution adviser	Responsible for constantly verifying that the refinery is operating within the provisions of environmental legislation and the standards adopted by the firm and the group.	Knowledge of the production process and technologies used. Up to the minute knowledge of all data concerning the refinery and its environmental effects. Knowledge of monitoring methods and pollution control and waste disposal techniques.	Pollution adviser. Corresponds to the ninth CCNL level.	Upper secondary technical school certificate (chemical technician). Vocational training: a long training is required; in Italy, in the firm itself, at the Rome headquarters, and with outside advisory services. Abroad, with a British advisory service which provides training for the group. Type of training: recurrent, theoretical/practical, on-the-job. Duration: 3-5 days. Level: 5 (EEC classification).

1. DESCRIPTION OF TASKS
2. KNOWLEDGE, COMPETENCES AND SKILLS
3. DENOMINATION OF OCCUPATIONS UNDER COLLECTIVE AGREEMENT OR CONTRACT
4. EDUCATION AND TRAINING, LEVELS, ETC.

Case study C.5

This establishment, located in the province of Vercelli, belongs to a company forming part of a leading Italian electronics group. It manufactures printed circuits for the national and international markets. For the purposes of collective agreements, the Company falls within the chemical sector.

The Company has 550 employees, including 250 women; the 370 manual workers are all holders of the lower secondary school certificate. Of the 50 technicians, 7 are graduates and the remainder hold upper secondary school certificates. Among the 16 managerial staff, 5 are graduates and the rest hold upper secondary school qualifications. There are 180 white collar workers, all of whom possess upper secondary school qualifications.

The Company's Ecology Department, responsible to the plant manager, can call on the services of group technicians and personnel from the Health and Safety, Maintenance and Quality Control Departments.

Hazards. The processes involved in the manufacture of printed circuits, described and analysed in the course of the present survey, present a variety of serious hazards. Problems in the raw materials input phase concern the storage of cupric chloride (refluents) and emissions of chlorine, methylene chloride and chlorophene. The manufacturing process involves the production of epoxy resin dust and emissions of solvents, acidic and basic vapours, and organic and photo-sensitive substances in gaseous form. Following the galvanising process, the finishing stage causes emissions of ammonia, solvents, organic substances, fluxes and pickling fluids, formic aldehyde, lead and tin.

The interviewees judged the environmental safety situation to be unsatisfactory, with many serious problems still unresolved.

To combat these hazards, the Company has an Ecology Department, to which certain specific personnel are assigned; this Department collaborates with personnel from other Departments, e.g. Health and Safety, Maintenance, the laboratories, etc.

Occupation	% of working time devoted to environmental activities	Qualifications
Ecology Department personnel	100	Upper secondary school certificate
Maintenance personnel	30	"
Laboratory staff	30	"
Safety Department personnel +	100	"
Health Department personnel +	100	" and degree in medicine

+ These personnel are concerned with problems of health and safety at work; these problems, and therefore the related activities, often overlap with environmental protection measures.

+ The table on the following page sets out the salient characteristics of these occupations.

TABLE 5
CASE STUDY C.5 SECTOR: Chemical industry

OCCUPATION	TASKS (1)	SKILLS AND COMPETENCES (2)	DENOMINATION (3)	EDUCATION AND TRAINING (4)
1. Ecology Department personnel	Application and verification of environmental protection standards. Promoting and coordinating monitoring activities and preventive measures.	Knowledge of the production process, the plant and the technologies used. Maintaining up to the minute data. Knowledge of standards and means of action.	Ecology Department technician. No contractual provisions exist; occupation governed solely by company's own regulations. These posts relate to CCNL levels 7 to 9.	Upper secondary school certificate. Vocational training: provided by company and group. Participation in outside courses and seminars. Self-instruction using group and outside manuals and documentation. Type of training: occasional, theoretical/practical, on-the-job. Duration: variable. Level: 4 (EEC).

1. DESCRIPTION OF TASKS
2. KNOWLEDGE, COMPETENCES AND SKILLS
3. DENOMINATION OF OCCUPATIONS UNDER COLLECTIVE AGREEMENT OR CONTRACT
4. EDUCATION AND TRAINING, LEVELS, ETC.

Case study C.6

This Company, which forms part of a leading Italian chemicals group, is located in the province of Alessandria. The Company has two production lines: 1) fluorine-based products; and 2) organic products (accelerators, vulcanizing agents, and various additives for the paper industry and the chemical industry in general). These products are sold chiefly on international markets.

The Company has 820 employees, including 100 women. Of the 500 manual workers, the majority are holders of the lower secondary school certificate and the rest have upper secondary school qualifications. There are 60 managerial staff and 260 white collar workers and technicians; about half have upper secondary qualifications and the remainder are graduates.

In the Company's organization chart, environmental protection tasks are entrusted to a specific service responsible to the general management. Research work and laboratories come under the deputy plant manager, while maintenance operations come under a "Services" Department.

Hazards. The Company is among the high-risk establishments covered by Table A of Decree 175|88 (the Seveso Directive). The fluorine production line presents hazards relating to the following: the storage and utilization of hydrofluoric acid, atmospheric emissions of fluoride compounds (treated by oxidation); vapours; water neutralization and treatment (biological waste treatment plant); special solid wastes (containers, packaging materials, maintenance materials, insulation materials - resins and epoxy resins - and plastic bags).

The organic product processing line presents the following hazards: atmospheric emissions of heptane (treated by refrigeration and activated carbon systems); water contaminants (treated by chemical, physical and biological systems); sludge consisting of 95% iron and 5% organic substances (dead bacteria) collected in approved tanks and discharged at authorized disposal sites); solid wastes consisting of gypsum from the neutralization plant, carbonates, fluorides and calcium sulphate, discharged at authorized disposal sites.

The environmental hazard situation was judged by interviewees to be generally satisfactory and under control.

The personnel involved in environmental protection activities are attached to various departments and have a variety of skills and competencies.

Occupation	% of working time devoted to environmental activities	Qualifications
General manager and two deputy managers	50	Degree in chemistry or engineering
Three research and technology staff	100	Engineering qualifications
Seven environmental laboratory staff	100	6 certificate holders and 1 graduate
Plant and maintenance technician	30	Upper secondary school certificate
Effluent plant technician	100	idem

The table on the following page gives further details.

TABLE 6

CASE STUDY C.6 SECTOR: Fine chemicals

OCCUPATION	TASKS (1)	SKILLS AND COMPETENCES (2)	DENOMINATION (3)	EDUCATION AND TRAINING (4)
General manager and deputy manager	Coordinating environmental protection activities. Modification of rules, standards and technical operations. Relations with outside bodies and the public authorities.	Overall knowledge of the plant, production processes and environmental problems. Knowledge of rules and standards.	Managers	University degree. Vocational training: internal (group) and external (seminars, meetings, etc.). Type: occasional, theoretical. Duration: variable. Level: 5 (EEC).
Research and technology staff	Seeking solutions to technical problems in conjunction with group's planning and engineering services and university institutions.	Knowledge of science and technologies. Knowledge of rules and standards.	Technology/ Research Officer (managerial grade)	Degree or diploma in chemistry or engineering. Vocational training: internal and external via refresher courses and seminars. Documentation, access to data banks and links with universities. Type of training: annual, theoretical/ practical, on-the-job. Duration: 1-7 days. Levels: 4 and 5 (EEC classification).
Environmental laboratory staff	Environmental monitoring in conjunction with analytical and sampling services. Relations with public authority departments and university centres.	Knowledge of methods of monitoring, sampling and analysis.	Laboratory Officer (managerial grade)	
Plant and maintenance technician	Routine and special maintenance activities in conjunction with outside enterprises. Work programming.	Knowledge of the plant and the technologies used.	Maintenance technician. Post corresponds to seventh and eighth CCNL levels	
Effluent plant technician	Treatment of liquid, solid and gaseous wastes.	Knowledge of the plant and effluent treatment methodology.	Effluent plant technician. Eighth level CCNL.	
			N.B.: these posts derive from the Company's own regulations.	

1. DESCRIPTION OF TASKS
2. KNOWLEDGE, COMPETENCES AND SKILLS
3. DENOMINATION OF OCCUPATIONS UNDER COLLECTIVE AGREEMENT OR CONTRACT
4. EDUCATION AND TRAINING, LEVELS, ETC.

Case study C.7

This Company, which forms part of a leading Italian group, is a tyre manufacturer located in the province of Turin. 70% of its production goes to the national market, 23% to the EEC and the remaining 7% to non-Community countries.

The Company has 1 822 employees, including 213 women. The average age of the 1 651 manual workers, who hold primary or lower secondary school qualifications, is 45. The 106 technicians hold either lower or upper secondary school certificates. There are 34 managerial staff, the majority of whom hold upper secondary school certificates, the remainder being graduates. Of the 31 white collar workers, some have State vocational school and others upper secondary school qualifications.

Environmental protection tasks are assigned to the "Health, Safety and Ecology Office", which forms part of the "Personnel, Organizations and Systems" Department. Waste disposal, however, is the responsibility of the "Quality" Department, in conjunction with the Health, Safety and Ecology Office.

Hazards. In tyre manufacturing the raw materials (raw rubber, carbon black, plasticizing oils and other ingredients) are first processed in a banbury mixer; this stage involves emissions of particulates containing carbon black and the production of wastes from the mixer (rubber and toxic plasticizing oils). The following stages - drawing, calendering and the coating of tringles - involve emissions of vapours and particulates and the production of waste fabric and tringles. The boilers use combustible oils with a high sulphur content; the particulates are filtered; grout containing silicone is produced and heat is emitted. The Company plans to convert the heating plant to the use of methane.

The machinery is cooled by water, which is discharged to the drainage system after softening. Other waste products include used oils and vulcanized rubber (sub-standard tyres) which are disposed of in accordance with provisions in force.

The heating plant was considered to present the highest risk situation; otherwise, interviewees believed the environmental hazard situation at the plant to be under control.

Research, monitoring, maintenance and other tasks relating to environmental problems are carried out by personnel attached to a variety of departments.

The manager of the Safety, Health and Ecology Office is responsible for coordinating all research and monitoring activities concerning both the health and safety of the Company's workers and the protection of the environment. The Office cooperates with the Technical Service, which integrates its own adjustment and maintenance activities with those relating to environmental protection. Waste disposal is the responsibility of the Company's Quality Department; the Safety, Health and Ecology Office is also responsible for relations with the group's technical services, outside bodies and the public authorities.

Occupation	% of working time devoted to environmental activities	Qualifications
a. Safety, Health and Ecology Office:		
- manager	50	Upper secondary school certificate
- assistant manager	50	"
b. Technical Department:		
- manager	10	"
- technicians (12)	10	"
c. Quality Department:		
- technician (one)	100	"

Further details are given in the table on the following page.

TABLE 7

CASE STUDY C.7 SECTOR: Chemical industry - tyre manufacture

OCCUPATION	TASKS (1)	SKILLS AND COMPETENCES (2)	DENOMINATION (3)	EDUCATION AND TRAINING (4)
1. Manager, Health, Safety and Ecology Office	Monitoring compliance with safety and environmental rules, coordination with group's headquarters.	Knowledge of national and international rules and standards.	No specific denomination exists under collective agreements.	Industrial trades technical school certificate.
Assistant manager	Implementation of environmental projects at organizational and technological level. Relations with other departments and the public authorities.	Knowledge of the manufacturing process and technologies, the plant and its environmental effects.	The head of the Office is a managerial grade; the assistant's post is seventh level.	Vocational training: at group's centre; theoretical and practical; self-instruction using group's manuals; seminars and meetings. Type of training: recurrent, on-the-job and in classroom. Duration: about 30 hrs per year. Levels: 4 and 5 (EEC classification).
2. Manager, Technical Department	Plant monitoring and maintenance.	Knowledge of the various techniques and methods employed.	The department head is a managerial grade.	"
Technician	Implementation of projects regarding plant, equipment, etc.		The technicians' posts are seventh and eighth level.	
3. Waste Disposal technician	Waste disposal. Relations with other firms and authorized agencies.	Knowledge of rules in force; checking reliability of waste disposal firms employed.	Seventh level.	"

1. DESCRIPTION OF TASKS
2. KNOWLEDGE, COMPETENCES AND SKILLS
3. DENOMINATION OF OCCUPATIONS UNDER COLLECTIVE AGREEMENT OR CONTRACT
4. EDUCATION AND TRAINING, LEVELS, ETC.

Case study M.1

This establishment is a steelworks belonging to a major Italian group and located in Aosta; it specializes in the production of stainless and other special steels.

Its production goes both to the national market and to the EEC (in which it holds 52% of the valve market); the remainder is exported to non-Community countries.

The Company has 2 300 employees, including 30 women. The 1 845 manual workers all hold lower secondary school certificates; the 100 technicians are evenly divided between upper and lower secondary school certificate holders, as are the 317 white collar employees. There are 38 middle management staff, of whom 90% hold upper secondary school certificates, while the remainder have lower secondary qualifications. Most of the 17 top-level managers hold degrees in engineering, economics or law.

The "Safety, Environment and Ecology" Service is attached to the Personnel Department; it is responsible for monitoring and planning preventive measures both internal (for the protection and safety of the workforce) and external (for the protection of the environment). The implementation of these measures and plant maintenance are the tasks of the firm's technical department.

Hazards. The production processes present a wide range of serious hazards, both for the environment and the workforce. A salient problem is the emission of vapours, especially from the melting furnaces; treatment of these vapours gives rise to the production of about 5-6 000 tonnes of dust per year. In addition, approximately 53 000 tonnes of furnace slags result from the annual production of around 200 000 tonnes of steels. The management of these wastes is the firm's major problem; at present authorized waste disposal services are employed. Other problems, partly resolved, concern the production of scrap metal, spent liquids and oils, sludge (also exported off-site to authorized disposal sites) and gaseous emissions from the pickling tanks).

Other serious problems relate to energy production and concern the presence of oils (PCB and PCT) in the transformers and emissions of methane, propane, diesel oil and other waste oils (collected by appropriate waste disposal services).

The establishment is covered by Table B of Decree 175|88 (the Seveso Directive).

The personnel of the "Safety, Environment and Ecology" Department have the task of overseeing the application of rules and safety standards and making proposals for improvements and preventive measures; the Department is also responsible for relations with the outside bodies and public authorities involved. The search for solutions to problems is the task of the plant manager's office attached to the Technical Department. Environmental monitoring activities are carried out by outside firms. The adjustment and maintenance of pollution control equipment is the responsibility of a team made up of personnel from the plant manager's office and the Safety, Environment and Ecology Department.

Occupation	% of working time devoted to environmental activities	Qualifications
Coordinator, environmental activities	100	Upper secondary school certificate
Health and safety officer	100	Vocational education certificate
Ecology officer	100	"
Administrative procedures officer	100	"

The denominations of these posts and the corresponding grades are specified in the firm's regulations and in contractual provisions. The table on the following page gives further details.

TABLE 8

CASE STUDY M.1 SECTOR: Iron and steel industry (special steels)

OCCUPATION	TASKS (1)	SKILLS AND COMPETENCES (2)	DENOMINATION (3)	EDUCATION AND TRAINING (4)
1. Coordinator, environmental activities	Identifying problems and proposing solutions. Monitoring compliance with rules and standards.	Knowledge of the industry, both from the technological and social points of view. Knowledge the environmental and social situation in the area.	This post is provided for in the firm's regulations and carries a managerial grade.	Industrial trades technical school certificate. Vocational training: course given by the firm's technical and administrative school; participation in internal and outside updating courses. Type of training: annual, theoretical/ practical, and self-instruction. Duration: 7-15 days. Level: 5 (EEC).
2. Health and safety officer Ecology officer	Checking and maintenance of pollution control equipment.	Knowledge of the techniques, standards, and methods relating to the field of activity.	These posts correspond to the eighth level. Contractual agreement.	Vocational education certificate. Vocational training: in-firm and outside courses, self-instruction. The administrative procedures officer has attended a regional course. Type of training: recurrent, annual, on-the-job. Duration: 7-15 days. Levels: 3 and 4 (EEC classification).
3. Administrative procedures officer (ecology and fire prevention)	Execution of administrative procedures relating to authorizations, renewals, declarations, etc.	Knowledge of legislative provisions, procedures and the bodies involved.	This post corresponds to the sixth level. Contractual agreement.	

1. DESCRIPTION OF TASKS
2. KNOWLEDGE, COMPETENCES AND SKILLS
3. DENOMINATION OF OCCUPATIONS UNDER COLLECTIVE AGREEMENT OR CONTRACT
4. EDUCATION AND TRAINING, LEVELS, ETC.

Case study M.2

Case study M.2 presents an aluminium foundry specializing in the production of cylinder heads; the Company belongs to a leading Italian group and is located in the province of Turin. Its production goes to national, Community and international markets.

The Company has 2 100 employees. Of these:
- 1 700 are manual workers, holding lower secondary certificates,
- 350 are white collar workers, all holding upper secondary school certificates,
- 50 are managerial staff, of whom some are graduates and the rest hold upper secondary school qualifications.

Monitoring and preventive measures in the fields of health, safety and environmental protection are the responsibility of the Personnel Department. In particular, the plant and maintenance manager coordinates pollution control activities relating to emissions and waste disposal and collaborates with the manager of the "Safety, Accidents and Occupational Diseases" Department to frame and implement joint strategies to improve safety and combat hazards.

Hazards. The processing of aluminium for the manufacturing of cylinder heads gives rise to atmospheric emissions of vapours from smelting (only partially filtered), discharging the trolleys, and high temperature reactions due to contact between the melt and the foundry sand. Waste products include:
- foundry sand, which is almost fully recycled (unusable sands are disposed of at authorized sites);
- scrap metal and shavings, which are remelted;
- other metal wastes, which are handed over to another firm for recycling.

Water is discharged to the drainage system or to the river Po after treatment in a purification plant.

The situation, especially with regard to atmospheric emissions, was considered unsatisfactory and new solutions are being sought.

Research and development activities in relation to environmental problems are carried out by the group's research centre and outside advisory services. Maintenance and adjustment of the pollution control equipment is carried out by outside firms (cleaning of furnaces) or by the suppliers (e.g. changing of filters). The personnel manager is responsible for relations with outside bodies and the public authorities. The plant and maintenance manager, in collaboration with the manager of the Health and Safety Department, coordinates these activities, programmes measures to be taken, ensures compliance with rules and the Company's standards, etc.

The following are the personnel most closely involved in environmental activities.

Occupation	% of working time devoted to environmental activities	Qualifications
1. Plant and maintenance manager	50	Upper secondary school certificate
2. Health and safety officer	100 +	"

+ Since no clear demarcation between the two areas of activity is possible, this figure includes time devoted to internal preventive measures and the protection of workers' health.

The table on the following page gives further details. 49

TABLE 9
CASE STUDY M.2 SECTOR: Metallurgy (aluminium products)

OCCUPATION	TASKS (1)	SKILLS AND COMPETENCES (2)	DENOMINATION (3)	EDUCATION AND TRAINING (4)
1. Plant and maintenance manager	Maintaining efficiency of extraction and filtration plant for liquid and gaseous wastes. Consignment of wastes and monitoring of disposal sites. Research and experimentation to improve plant.	Knowledge of plant and pollutants. Knowledge of national and Community rules and standards. Knowledge of the relevant technologies and technological advances.	Plant and maintenance manager responsible for effluents and waste disposal. Corresponds to 7th level (CCNL).	Schooling: . Upper secondary or upper secondary technical school. Vocational training: . internal: refresher courses given by groups centre, self-instruction using manual, reviews and scientific documentation. Type of training: . recurrent, theoretical|practical, on-the-job. Duration: one week. Levels: 3 and 4 (EEC classification).
2. Health and safety officer	Analysis of accidents. Monitoring compliance of plant and machinery with health and safety requirements and environmental protection standards.		Health and safety officer. Corresponds to 7th level (CCNL).	

1. DESCRIPTION OF TASKS
2. KNOWLEDGE, COMPETENCES AND SKILLS
3. DENOMINATION OF OCCUPATIONS UNDER COLLECTIVE AGREEMENT OR CONTRACT
4. EDUCATION AND TRAINING, LEVELS, ETC.

Case study M.3

This Company, located in the province of Turin, is a manufacturer of hot-rolled steel products: concrete reinforcing bars, and flat bars and squares for industry. Its production goes to national, Community and international markets.

The Company has 670 employees, including 27 women (the latter are all white collar workers). The 500 manual workers have primary or lower secondary school certificates. There are 160 white collar workers, all holders of the upper secondary school certificate. The 10 managerial staff mainly hold degrees in engineering, economics or law.

Environmental problems and ecological protection are the responsibility of the Ecology Office attached to the Personnel Department. This Office is also responsible for relations with outside bodies and the public authorities. The firm's Technical Department is responsible for maintaining the pollution control equipment; environmental monitoring is carried out by authorized outside firms.

Hazards. The principal hazards relate to vapour emissions and slag from smelting, and dust and sludge resulting from vapour treatment. Zinc and certain secondary materials are recovered by other firms. The interviewees judged the overall pollution control situation to be satisfactory.

Personnel involved full-time or part-time in environmental activities are the following:

Occupation	% of working time devoted to environmental activities	Qualifications
Maintenance technician	50	Vocational training certificate
Effluent plant operator	100	idem
Personnel manager, responsible for outside relations	20	Degree in law

Further details regarding these occupations are given in the table on the following page.

TABLE 10

CASE STUDY M.3 SECTOR: Iron and steel industry

OCCUPATION	TASKS (1)	SKILLS AND COMPETENCES (2)	DENOMINATION (3)	EDUCATION AND TRAINING (4)
Maintenance technician	Regular maintenance of safety and effluent plant during weekly closure.	Knowledge of plant and products.	No specific post of maintenance technician is provided for. Post corresponds to fifth level.	Upper secondary technical school certificate. Vocational training: no systematic training activities are provided; self-instruction and attendance at meetings and seminars. Type of training: occasional, on-the-job. Duration: variable. Level: 3 (EEC classification).
Effluent plant operator	Operation of effluent plant, ensuring compliance with rules and standards.	Knowledge of production process and technologies. Knowledge of rules and standards.	Idem	

1. DESCRIPTION OF TASKS
2. KNOWLEDGE, COMPETENCES AND SKILLS
3. DENOMINATION OF OCCUPATIONS UNDER COLLECTIVE AGREEMENT OR CONTRACT
4. EDUCATION AND TRAINING, LEVELS, ETC.

CHAPTER IV

CONCLUSIONS

1. The groups of activities

The groups of activities (see Chapter I, paragraph 1.2) are identified in functional terms in relation to the classification of tasks, since in firms' organization structures environmental protection activities often overlap with the activities of other departments such as health and safety at work, procurement, marketing, production, etc.

The groups of activities listed below, although not always representative of firms' organization structures, nevertheless make it possible to draw up a catalogue of the tasks relating to the occupations in question. Since the sample under study was small (10 firms) and restricted to two sectors only (the metal and chemical industries), we cannot claim that the catalogue below is exhaustive; we believe, however, that it constitutes an adequate point of departure for further research.

The table below lists the groups of activities and tasks identified in the course of our research.

GROUPS OF ACTIVITIES	TASKS
1. Coordination and planning	1. coordination of services and resources; 2. identification and evaluation of hazards; 3. problem solving at organizational and technical levels; 4. ensuring compliance with rules; defining company standards; 5. control, verification and evaluation of measures taken; 6. relations with advisory services; 7. relations with outside bodies and the public authorities; responsibility for administrative procedures; 8. planning the provision of information and training for workers regarding hazards, safety procedures and preventive measures; 9. planning and coordination of evacuation plans and alarm systems;
2. research and development, innovation and problem solving	10. analysing production processes and hazards; 11. problem-solving at technical and organizational level (change and innovation); 12. study of rules, standards and accident prevention methodology; 13. study of environmental effects and evaluation of the consequences;

3. pollution control and monitoring	14. waste treatment plant management; 15. monitoring of solid, liquid and gaseous wastes to check compliance with legal requirements and company standards; 16. taking samples of pollutants, qualitative and quantitative analyses; 17. perfecting and implementing techniques and procedures for pollution control and the treatment of waste water and gaseous emissions; 18. implementation of measures aimed at improvements and pollution control;
4. plant safety, major hazards, fire prevention	19. checking plant safety; 20. adoption of safety measures in conformity with provisions on major-accident hazards (Decree 175|1988); 21. carrying out changes and modifications to plant and safety and accident prevention systems; 22. fire prevention measures; 23. checking of fire fighting systems; 24. training of volunteer fire fighters; 25. recording and evaluation of accidents; 26. stopping machinery and production lines in the event of danger;
5. adjustment and maintenance	27. maintenance of safety and pollution control equipment and systems; 28. changing filters, fluids and routine maintenance; 29. planning exceptional maintenance operations; 30. emergency measures;
6. waste management	31. collection, classification, storage, treatment, transport and disposal of wastes; 32. maintaining register of input and disposal of wastes; 33. carrying out legal and administrative procedures.

BEST COPY AVAILABLE

2. Analysis of occupations

The occupations identified represent a pool of resources in the form of knowledge, skills and capacities in the field of environmental protection. These occupations differ in the levels of autonomy, responsibility and complexity relating to the performance of the tasks assigned to them.

To describe and analyse these occupations we thought it necessary to refer to an analytical model designed to identify the differences between the various types of occupation and highlight their principal characteristics. For this reason, we used a model prepared by the ISFOL, based on the differentiation of three fundamental types of occupation:

A. managerial (management, coordination and control);
B. technical (maintenance, innovation, etc.);
C. operational (processing, operation of plant and equipment).

Following this model, it is possible to associate one or more fields of activity with each of these basic typesof occupation. The following table sets out these activities in general terms.

Type of occupation	Activities
Managerial	Integration of specialized fields of activity Combining resources and ensuring compatibility Ensuring profitability of production.
Technical	Seeking innovation in technologies and processes Development and innovation as regards products Constitution and improvement of the firm's know-how Ensuring technical efficiency of solutions adopted.
Operational	Execution of predefined tasks Cooperation at social level Compliance with efficiency standards.

These activities represent the contribution required by the firm from each type of occupation.

On the basis of these elements, the occupations described in the case studies can now be classified under one of the three basic groups: managerial, technical, and operational.

Criteria for the description and classification of the occupations are set out in the following table.

DISTINGUISHING FACTORS	TYPE OF OCCUPATION		
	Operational	Technical	Managerial
Decision-making	Criteria regarding conformity with company rules, procedures and practice	Criteria regarding technical efficiency	Profitability criteria
Nature of contribution and activities	Activities concerning the production process or the monitoring and supervision of the latter	Problem-solving activities (technical improvements/ innovations)	Activities concerning the combination of resources
Results of activities	Technical, recurrent	Solutions to technical problems: improvements/ innovation	Economic (improving profitability of product)
Quality of results	Conformity with quantitative and qualitative standards laid down by company (whether formally or otherwise)	Improvement of recurrent technical operations or company know-how	Maximization of cost/earnings ratio
Methodology	Application of procedures determined by company, or company practice	Determination of procedures by post-holder through application of method	Adoption of strategies and courses of action to meet situations characterized by a multiplicity of variables
Type of input	Preliminary data: . abundant . explicit . unambiguous Further data: . recurrent and diffuse . obtained by selection from the former	Preliminary data: . limited . synoptic/homogeneous . requires deciphering Further data: . clusters of aggregates . requires analysis	Preliminary data: . limited . aggregate/ heterogeneous . requires deciphering Further data: . varied (plurality of sources and unpredictability of events) . requires identification, assimilation and subsumption

Table 1a

DISTINGUISHING FACTORS	TYPE OF OCCUPATION		
	Operational	Technical	Managerial
Type of variables involved	Homogeneous Predictable	Diverse, but only in technical aspects. Technical/scientific. Sequence and combination not fully predictable.	Heterogeneous. Technical, economic and behavioural (as regards agents in competitive situations).
Education and skills	Secondary schooling, technical and practical skills	Higher education qualifications. Formal technical/ scientific knowledge.	Higher education/ university qualifications; inter-disciplinary skills and knowledge.
Experience	Relates to technical and practical problems (constitution of fund of experience and empirical knowledge)	Relates to technical/scientific problems (fund of problem-solving experience)	Relates to inter-disciplinary responsibilities (fund of knowledge of operation of technical, economic and organizational systems).
Relations conducted	At team level. Joint control of output. Cooperative.	At team level or with other bodies having similar technical objectives. Predominantly cooperative.	Overseeing relations between individuals, groups and bodies, both internal and external. Predominantly competitive.

3. Classification of occupations identified in the survey

The criteria referred to make it possible to distinguish between the various occupations and classify the respective levels and grades.

We thought it of value to review the occupations identified in the case studies, attempting to classify them on the basis of the analytical model described.

Criteria relating to the following were applied:

a. Decision making
b. Nature of activities
c. Type and quality of results
d. Methodology
e. Type of input
f. Type of variables involved
g. Skills and experience
h. Relations conducted

CASE STUDY C.1

1. Coordinator, safety and environmental protection

a. applies criteria relating to technical efficiency to the firm's operations,

b. his activities predominantly concern finding and applying solutions to technical problems (adapting company standards and environmental policies to production systems and ensuring application of the most restrictive rules),

c. the results of the activities essentially concern the solving of technical problems,

d. he defines procedures to be followed derived from the application of methods and standards (e.g., means of implementation of environmental protection projects at organizational and technological level),

e. acts on the basis of data which require deciphering and adaptation,

f. operates on the basis of technical and scientific variables whose interaction with other variables is not fully known,

g. possesses technical and scientific knowledge and high-grade specialized training qualifications,

h. post-holder must have experience relating to the technical and scientific aspects of environmental protection in industry,

i. coordinates with bodies or departments concerned with environmental protection, whether internal or outside.

This occupation should be classified as primarily technical, although it involves certain tasks of a managerial nature: criteria regarding economic viability enter into the decision-making processes, and activities aimed at combining resources and inter-disciplinary skills.

The tasks relating to this occupation are: nos 1, 3, 4, 5, 6, 7, 10, 11 and 12.

2. Health officer and safety officer

a. the post-holders act in accordance with the firm's rules, procedures and practice and criteria relating to technical efficiency,

b. their activities mainly concern monitoring and preventive measures (including the identification and evaluation of hazards and accidents),

c. the results of the activities are technical, recurrent and in conformity with standards defined by the firm,

d. the post-holders apply procedures predetermined at technical and|or legislative level and approved by the firm,

e. they operate on the basis of abundant, but clearly-defined data,

f. they are concerned with combinations of technical variables,

g. the post-holders must possess a basis of knowledge both theoretical and practical; their experience must relate to technical and practical problem-solving,

h. their relations are of the cooperative type (e.g. exchanges with internal and outside bodies and departments).

Although in part technical, this occupation can be classified as predominantly operational.

This occupation relates to the following tasks: nos 6, 7, 10, 14, 15, 16, 17, 18, 19, 20 and 25.

3. Waste disposal officer

a. the post-holder acts in accordance with company standards, procedures and practice and criteria regarding technical efficiency,

b. his activities mainly concern monitoring and supervision (keeping the register of waste input and disposal, supervising the storage of wastes and ensuring homogeneity, supervising and checking methods of transport),

c. the results of the activities are therefore technical, recurrent, and in conformity with company standards,

d. the post-holder implements technical procedures pre-determined by the firm,

e. he acts on the basis of abundant data of known characteristics (e.g. the characteristics of materials for storage and disposal),

f. he acts on the basis of variables whose fluctuations are predictable (e.g., quantities to be stored, methods of transport, etc.),

g. the post-holder must possess a basis of technical and practical knowledge and a medium educational level (upper secondary school, industrial trades technical school); his experience must relate to the solving of technical and practical problems,

h. relations within the organization are of the cooperative type (links with other departments).

This occupation can be classified as operational.

The related tasks are: 31, 32 and 33.

4. Fire prevention officer

a. the post-holder acts in accordance with company standards, procedures and practice and criteria regarding technical efficiency,

b. his activities mainly concern monitoring and supervision (monitoring of plant and fire fighting equipment),

c. the activities are therefore technical, recurrent and in conformity with company standards,

d. the results of these activities are obtained through the implementation of technical procedures defined by the firm,

e. the post-holder acts on the basis of abundant data of which the significance is unambiguous (e.g., conformity of plant and fire fighting equipment),

f. he acts on the basis of technical variables,

g. the post-holder must possess a basis of technical and practical knowledge and a medium educational level (upper secondary school, industrial trades technical school); his experience must relate to the solving of technical and practical problems,

h. relations with the organization are of the cooperative type (liaison with other departments); an organizational capacity is required since he is called on to train volunteer fire-fighters.

This occupation may be classified as operational.

The related tasks are: 22, 23 and 24.

CASE STUDY C.2

1. Personnel manager

a. the post-holder acts on the basis of economic considerations and criteria regarding the effectiveness of technical measures taken to ensure conformity with the provisions of environmental protection legislation,

b. his activities involve the coordination of all the firm's human resources,

c. the result aimed at is economic and concerns the optimization of the relationship between the effectiveness of the measures taken and conformity with the firm's objectives,

BEST COPY AVAILABLE

d. from the methodological viewpoint, he acts and develops a strategy in relation to a number of variables (technical, economic, legal, etc.) and agents (the company management, trade unions, public authorities, etc.),

e. he uses and deciphers heterogeneous data from a multiplicity of sources; the events to be taken into consideration are often fortuitous in character,

f. the post-holder is required to have a university education and experience relating to the operation of technical, economic and organizational systems,

g. he maintains relations with internal and outside groups and bodies (e.g., local authority environmental protection departments).

This occupation should be classified as managerial, with organizational activities and activities relating to legal questions.
The related tasks are: 1, 3, 4, 5, 6, 7, 8 and 9.

2. Plant and maintenance technician

a. the post-holder acts in accordance with company standards and directives, and criteria regarding the technical efficiency of measures taken,

b. his activities concern the supervision and improvement of technical measures designed to solve problems regarding the plant and environmental protection,

c. the results aimed at concern conformity with, and improvements to, the firm's technical standards,

d. procedures determined by the company are applied, but with a margin for discretion,

e. abundant data are used, of which part is clearly defined and the remainder requires deciphering,

f. the variables relate to rules and technical matters; their interaction is not always predictable,

g. the post-holder must possess secondary technical school qualifications and experience in the field of plant maintenance and environmental protection,

h. relations within the organization are of the cooperative type and concern the achievement of technical objectives.

This occupation should be classified as operational and technical.
The related tasks are: 11, 12, 14, 15, 16, 19, 20, 21, 22, 27, 28 and 29.

CASE STUDY C.3

1. Managing director

a. the post-holder acts on the basis of economic considerations and criteria regarding the effectiveness of technical measures adopted in conformity with the provisions of environmental protection legislation,

b. his activities concern the coordination of all the company's technical, technological and human resources,

c. the results aimed at are economic and concern the optimization of the relationship between the effectiveness of the measures taken and conformity with the firm's overall objectives,

d. from the methodological point of view, he acts, and develops strategies, in relation to a multiplicity of variables (production, technical, economic, legal, etc.) and agents (company management, trade unions, public authorities, etc.),

e. he uses and deciphers heterogeneous data from a multiplicity of sources; the events to be taken into consideration are often fortuitous in character,

f. the post-holder is required to possess university qualifications, inter-disciplinary skills, and management experience in relation to technical, economic and organizational systems,

g. he is responsible for relations with individuals, groups and bodies both inside and outside the firm (e.g., local authority environmental protection departments).

This occupation should be classified as managerial.
The related tasks are: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12 and 13.

2. Safety and environmental management technician

a. the post-holder acts in accordance with criteria regarding technical efficiency,

b. his activities concern the supervision and improvement of measures designed to solve environmental protection problems,

c. the activities are aimed at ensuring conformity with standards and improving the results obtained; the post-holder is empowered to act in the event of anomalies (e.g., he can stop the machinery and the production line),

d. he applies methods and procedures laid down by the firm,

e. the data available are abundant, recurrent and often require deciphering,

f. the variables with which he operates are technical and scientific,

g. the post-holder should possess good upper secondary education qualifications and some experience in the field of technical and scientific problems,

h. relations are predominantly of the cooperative type; relations with the firm's management are also involved.

This occupation should be classified as technical.
The related tasks are: 14, 15, 16, 17, 18, 19, 25 and 26.

CASE STUDY C.4

1. Pollution adviser

a. the post-holder is a specialist who acts in accordance with decision-making criteria relating to technical efficiency,

b. his activities are aimed at finding solutions to safety and environmental protection problems; the post-holder seeks constantly to check the application of rules in force and improve technical standards,

c. the result aimed at is the improvement of the technical and organizational aspects of environmental protection,

d. the post-holder acts in accordance with procedures derived from the application of standardized methods, with some degree of discretion,

e. the data he uses must be constantly deciphered and updated,

f. the variables involved are technical and scientific and their interaction is fairly predictable,

g. the post-holder should possess high educational qualifications and experience in the field of technical and scientific problem-solving,

h. he carries out his activities in cooperation with the firm's management.

This occupation should be classified as technical (specialized).

The tasks involved are: 2,3, 4, 5, 6, 7, 10, 11, 12, 14, 15, 16, 17, 18, 19, 20, 21, 22 and 27.

CASE STUDY C.5

1. Ecology Department personnel

a. the post-holders act in accordance with the firm's standards and directives and criteria regarding the technical efficiency of the measures taken,

b. their activities concern the supervision and improvement of measures designed to solve problems regarding environmental protection, the plant and the technologies used,

c. the aim is to ensure conformity with, and the improvement of, the firm's technical standards,

d. in developing these activities, procedures laid down by the firm are applied, with a margin for innovation,

e. of the abundant data input, part is explicit and the remainder requires deciphering,

f. the variables are regulatory and technical; their interaction is not fully predictable,

g. post-holders should possess good technical school qualifications and considerable experience in the fields of plant operation and environmental monitoring and protection techniques,

h. relations within the organization are of the cooperative type and concern the attainment of technical objectives. The post-holders act in close liaison with the firm's management.

This occupation is operational and technical (specialized).
The related tasks are: 2, 3, 4, 5, 6, 7, 10, 11, 12, 14, 15, 16, 17, 18, 19, 20, 21, 22 and 27.

CASE STUDY C.6

1. General manager

a. the post-holder acts in accordance with criteria relating to the firm's profitability,

b. the firm's Environmental Protection Department is directly responsible to him; his activities predominantly involve decision-making, and coordinating the firm's human, technical and economic resources,

c. the activities are aimed at the maximization of the cost|effectiveness ratio,

d. he acts in accordance with strategies which take account of a wide range of variables,

e. he has available aggregate data, part of which must be constantly deciphered and updated,

f. the variables involved are technical, economic and behavioural (many different agents are involved, whether inside or outside the firm),

g. he holds university qualifications (science) and possesses inter-disciplinary skills,

BEST COPY AVAILABLE

h. he is responsible for relations with and between the firm's internal technical, economic and organizational systems and for relations with the environmental protection services of the public authorities.

This occupation is managerial, combining technical, organizational and administrative skills.
The related tasks are: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12 and 13.

2. Deputy manager

a. the post-holder acts in accordance with criteria relating to profitability and technical efficiency,

b. the "Research and laboratories" or "Maintenance and waste treatment plant" departments may be responsible to him as deputy manager; his activities mainly concern the coordiantion of human, technical and economic resources for which he is responsible,

c. the activities are aimed at the maximization of the cost|effectiveness ratio,

d. he acts in accordance with strategies, procedures and methods which are constantly updated,

e. he has at his disposal aggregate data, part of which must be deciphered and constantly updated,

f. the variables involved are mainly regulatory, technical and economic,

g. he possesses university qualifications (science) and has inter-disciplinary skills,

h. he is responsible, together with the firm's management, for relations with and between the firm's technical, economic and organizational systems and for relations with the environmental protection services of the public authorities.

This occupation is managerial, with technical, organizational and administrative skills and competencies.
The related tasks are: 1, 2, 3, 4, 14, 15, 16, 17, 18, 19, 25 and 27.

3. Research and technology department personnel

a. these personnel act in accordance with criteria relating to technical efficiency in seeking solutions making for plant safety and safe technologies,

b. their activities involve a continuing search for improvements and innovation in relation to technical problems,

c. the results contibute to the firm's know-how,

d. the post-holders apply procedures and methods which take account of a wide range of variables,

e. the data input is limited, and requires constant deciphering and updating,

f. the variables are technical and scientific,

g. university qualifications (inter-disciplinary) are required, together with a wide range of experience in the area of technological and scientific problems,

h. the post-holders maintain relations with other internal departments, and with universities and outside research institutes.

This occupation is technical (specialized).
The related tasks are: 10, 11, 12 and 13.

4. Environmental laboratory personnel

a. the post-holders are responsible for environmental monitoring, conducted in accordance with company rules and scientific procedures,

b. their activities mainly concern supervision and monitoring,

c. the activities are recurrent and are aimed at ensuring conformity with quantitative and qualitative standards laid down by the firm,

d. the post-holders apply sampling and analysis procedures based on scientific methods,

e. the data are explicit, to be obtained through the use of instruments and deciphered,

f. the variables are technical and scientific,

g. upper secondary school and/or university qualifications are required, together with knowledge and experience in the technical and scientific fields,

h. the post-holders maintain relations with other internal departments and with local authority environmental protection services.

This occupation should be classified as technical (specialized).
The related tasks are: 6, 7, 14, 15, 16, 17 and 18.

5. Plant and maintenance technician

a. the post-holder is responsible for plant maintenance, including waste treatment plant. He acts in conformity with company rules and standards,

b. activities mainly concern monitoring and adjustment,

c. the results of the activities are technical and recurrent,

d. the post-holder applies procedures determined and programmed by the firm (and also by outside advisers),

e. the data used is explicit and recurrent,

f. the post-holder monitors tehcnical variables,

g. upper secondary school and|or university qualifications are required, in addition to knowledge and experience regarding the technical problems to be tackled,

h. he acts in liaison with the firm's management and environmental protection services.

This occupation is primarily operational and technical (specialized). The related tasks are: 19, 21, 27, 28 and 29.

6. Effluent plant technician

a. the post-holder acts in accordance with company rules and procedures,

b. his activities concern the control and monitoring of the treatment of gaseous, liquid and solid wastes,

c. the activities are technical and aimed at ensuring conformity with the quantitative and qualitative standards laid down by the firm,

d. the post-holder employs procedures based on the application of methods,

e. the data input is limited and must be regularly updated,

f. the variables are technical,

g. upper secondary school and|or university qualifications are required, together with technical and practical skills and experience,

h. the post-holder maintains relations with the research department, the laboratories and the maintenance department.

This occupation is essentially operational and technical (specialized). The related tasks are: 14, 15, 17, 31, 32 and 33.

CASE STUDY C.7

1. Manager, Health, Safety and Ecology Office

a. the post-holder seeks technical efficiency in respect of the results of the activities for which he is responsible,

b. his activities primarily involve finding and applying solutions to technical problems (implementation of organizational and technological projects for environmental protection; monitoring compliance with environmental pollution standards),

c. the results of the activities concern the solving of technical problems,

d. the post-holder determines the procedures to be followed on the basis of a method (e.g. the means used to implement organizational and technological projects for environmental protection),

e. he acts on the basis of synoptic and homogeneous data which often require deciphering,

f. the variables are technical and scientific; their integration and combination is not fully predictable,

g. upper secondary and|or university qualifications are required, plus formal technical and scientific knowledge,

h. the post-holder must possess experience in the field of technical and scientific problems relating to environmental protection,

i. he maintains relations with bodies concerned with the achievement of technical objectives.

This occupation is technical (specialized).
The related tasks are: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12 and 13.

2. Assistant manager, Health, Safety and Ecology Office

a. the post-holder acts in accordance with established standards and procedures,

b. his activities concern administrative procedures relating to environmental protection (relations with advisers, reports, applications for authorization, etc.),

c. the results of the activities are recurrent and relate to technical and administrative matters,

d. the post-holder follows predetermined procedures,

e. he uses explicit and recurrent data requiring constant updating,

f. the variables are homogeneous,

g. upper secondary school qualifications are required, together with technical and administrative skills in the relevant field.

This occupation should be classified as operational.
The related tasks are: 1, 6 and 7.

3. Manager, Technical Department

a. the post-holder is responsible for the supervision and maintenance of plant, including pollution control equipment. He acts in accordance with company rules and standards,

b. his activities predominantly concern monitoring, adjustment and innovation,

c. the results of the activities are technical, recurrent, and - sometimes - innovative,

d. the post-holder follows procedures and implements projects defined and programmed by the company (sometimes in conjunction with group or outside advisers),

e. he uses explicit and recurrent data,

f. the variables involved are technical,

g. upper secondary school and|or university qualifications are required, in addition to knowledge and experience regarding the technical problems to be tackled,

h. the post-holder acts in liaison with the firm's management and environmental protection services.

This occupation should be classified as technical (specialized), with managerial and operational skills.
The related tasks are: 19, 21, 27, 28 and 29.

4. Waste disposal technician (Quality Department)

a. the post-holder acts in accordance with company rules, procedures and practice, and criteria regarding technical efficiency,

b. his activities are predominantly supervisory (maintaining the register of waste input and disposal, supervising the storage of waste products and ensuring homogeneity, supervising and monitoring methods of transport, maintaining relations with waste disposal firms and the public authorities),

c. the results of the activities are therefore technical, recurrent, and in conformity with standards laid down by the firm,

d. the post-holder follows procedures predetermined by the company,

e. the data input is abundant but of known characteristics (e.g., characteristics of materials for storage and disposal),

f. the variables are technical in nature and predictable (e.g., the quantities to be stored, methods of transport, etc.),

g. upper secondary or upper secondary technical school qualifications are required, together with a basis of technical and practical knowledge; the post-holder must have experience in the field of technical and practical problems,

h. relations within the organization are of the cooperative type (liaison with other departments).

This occupation should be classified as essentially operational.
The related tasks are: 31, 32 and 33.

CASE STUDY M.1

1. Coordinator, environmental protection activities
(Safety, Environment and Ecology Department)

a. the post-holder applies criteria regarding technical efficiency in his work of identifying, evaluating and solving environmental protection problems,

b. his activities concern the solution of problems relating to environmental and other hazards and adaptation to rules and standards,

c. the activities are aimed at improvements and innovation,

d. the post-holder determines operational procedures following a method,

e. he uses data which require deciphering and necessitate research activities and updating,

f. the variables are regulatory, technical and scientific,

g. a high educational level is required, together with experience relating to the technical and scientific problems to be tackled,

h. relations with company and group departments are cooperative, and are aimed at the achievement of technical objectives.

This occupation should be classified as essentially technical (specialized). The related tasks are: 1, 2, 3, 4, 5, 6, 10, 11, 12, 13, 21 and 25.

2. Health and Safety Officer and Ecology Officer

a. these post-holders are responsible for environmental monitoring and the checking and maintenance of pollution control equipment. They act in accordance with the firm's rules and standards,

b. their activities predominantly concern monitoring, adjustment and innovation,

c. the results of the activities are technical and recurrent,

d. these post-holders implement procedures and projects defined and programmed by the company (sometimes in conjunction with group or outside advisers),

e. they use explicit and recurrent data,

f. the variables are technical,

g. vocational qualifications are required, together with knowledge and experience relating to the technical problems to be tackled,

h. the post-holders act in liaison with the Coordinator of the Safety, Environment and Ecology Department.

These occupations are essentially operational.
The relatedtasks are: 14, 15, 16, 17, 18, 19, 21 and 27.

BEST COPY AVAILABLE

3. Administrative procedures officer (Safety, Environment and Ecology dept.)

a. the post-holder acts in accordance with company procedures and legal requirements,

b. his activities concern the execution of administrative procedures relating to authorizations, renewals, reports, declarations, etc.,

c. the activities are recurrent and in conformity with formal procedures,

d. the data input is explicit and recurrent,

e. the variables are technical and regulatory and are predictable,

f. technical school qualifications are required, plus experience in the field of administrative procedures relating to technical problems,

g. the post-holder orders his own work in liaison with the department Coordinator and the public authorities.

This occupation is essentially operational.
The related tasks are: 7 and 22.

CASE STUDY M.2

1. Plant and maintenance manager (waste treatment)

a. the post-holder seeks technical efficiency in maintaining pumps, filtering and other equipment for gaseous emissions and waste water, and in the storage, disposal and monitoring of waste products,

b. his activities primarily concern problem solving and the improvement (innovation) of the systems used,

c. the activities are aimed at the improvement of company standards,

d. the post-holder determines procedures on the basis of a method,

e. he uses synoptic data, which require deciphering and constant updating,

f. the variables are regulatory, technical and scientific,

g. upper secondary school qualifications are required, plus experience in the area of the technical problems to be resolved,

h. relations within the organization are primarily of the cooperative type.

This occupation is technical (specialized).
The related tasks are: 10, 11, 14, 15, 19, 27, 28, 29 and 31.

2. Health and Safety Officer

a. the post-holder applies criteria relating to technical efficiency and conformity in analysing accidents and monitoring plant, machinery, the environment and the introduction of new technologies,

b. his activities relate to monitoring and problem-solving,

c. the activities are aimed at expanding the firm's know-how,

d. he acts in accordance with established methods and participates in planning,

e. the data are synoptic and require deciphering and constant updating,

f. the variables are technical and scientific and their interaction is not fully predictable,

g. high educational qualifications are required, plus experience in the appropriate field,

h. relations within the organization are of the cooperative type.

This occupation is essentially technical (specialized).
The related tasks are: 13, 14, 15, 19 and 25.

CASE STUDY M.3

1. Maintenance technicians

a. the post-holders act jointly to maintain safety and pollution control equipment in accordance with criteria relating to technical efficiency and conformity,

b. their activities concern monitoring and adjustment,

c. the activities are aimed at ensuring conformity with quantitative and qualitative standards laid down in legal provisions and by the firm,

d. the post-holders use procedures established by the company but with some discretion to establish their own procedures based on methods,

e. the data are explicit, recurrent and require constant updating,

f. the variables are technical and regulatory,

g. upper secondary technical school qualifications are required, in addition to extensive experience in the field of the activities concerned,

h. relations within the organization are of the cooperative type.

This occupation is essentially operational, but partially technical (specialized).
The related tasks are: 27, 28 and 29.

2. Effluent plant operators

a. the post-holders act jointly, in accordance with criteria relating to technical efficiency and conformity in operating the safety and pollution control equipment,

b. their activities concern monitoring and adjustment,

c. the activities are aimed at ensuring conformity with quantitative and qualitative standards laid down in legislative provisions and by the company,

d. the post-holders follow procedures established by the company but have some discretion to determine their own procedures in accordance with methods,

e. the data are explicit, recurrent and require constant updating,

f. the variables are technical and regulatory,

g. upper secondary technical school qualifications are required, plus extensive experience in the field concerned,

h. the relations maintained are of the cooperative type.

This occupation is essentially operational, but partly technical (specialized). The related tasks are: 14, 15, 16, 17 and 18.

A list of the occupations identified in the ten case studies is given below. The degree to which each occupation can be assigned to one of the three groups is indicated by the following symbols: +++ (to a great extent); ++ (to some extent); + (to a lesser extent).

TABLE 1

OCCUPATIONS IN THE CHEMICAL INDUSTRY

CASE STUDIES	MANAGERIAL	TECHNICAL	OPERATIONAL
C.1 Production of paints and enamels			
- Coordinator, safety and environmental protection	+	+++	
- Safety officer		+	+++
- Health officer		+	+++
- Waste disposal officer			+++
- Fire prevention officer			+++
C.2 Manufacture of insulated cables			
- Personnel manager	+++		
- Plant and maintenance technician		++	+++
C.3 Antibiotics production			
- Managing director	+++		
- Technician, safety and environmental management		+++	
C.4 Petroleum processing			
- Pollution adviser		+++	
C.5 Manufacture of printed circuits			
- Ecology dept. technician		++	+++
C.6 Fluorine-based and organic products			
- General manager and deputy manager	+++		
- Research and technology staff		+++	
- Laboratory staff		++	+++
- Plant and maintenance technician			+++
- Effluent plant technician			+++
C.7 Tyre manufacture			
- Manager, safety, health and ecology office		+++	
- Assistant manager			+++
- Manager, technical dept.		++	+++
- Waste disposal technician (Quality dept.)			+++

TABLE 2

OCCUPATIONS IN THE METAL INDUSTRY

	MANAGERIAL	TECHNICAL	OPERATIONAL
M.1 Production of special steels			
- Coordinator, environmental activities		+++	
- Health and safety officer			+++
- Ecology officer			+++
- Administrative procedures officer			+++
M.2 Aluminium foundry			
- Plant and maintenance manager		+++	
M.3 Hot-rolled steel products			
- Maintenance technician		+	+++
- Effluent plant operator		+	+++

4. Career development

Career development is often linked to a combination of factors dependent on, or inherent in, the work organization; however, certain general trends in career development in each of the three occupational groups deriving from the methodological model used may be identified:

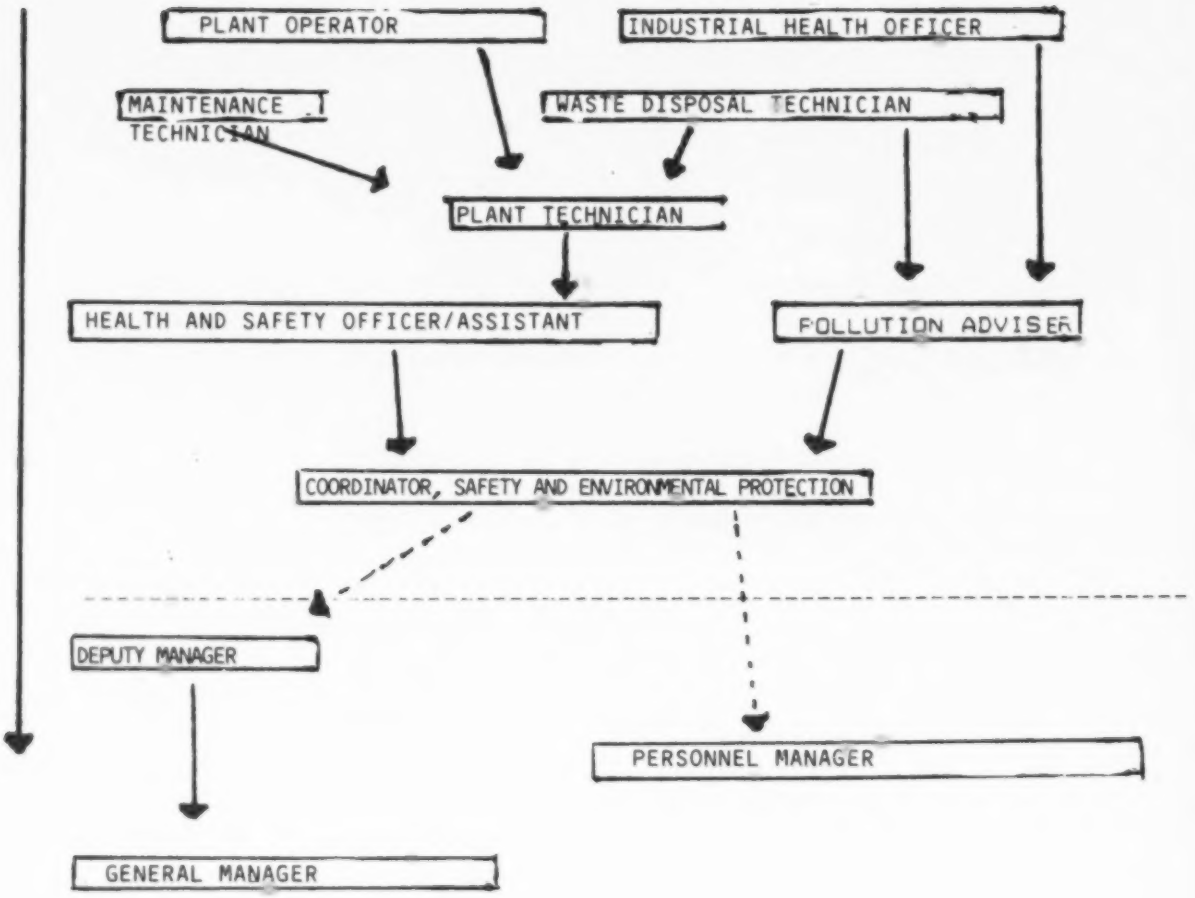
- managerial personnel rise in level in accordance with the extent of their responsibilities and the degree of risk involved in their decisions, which in the present case concern the coordination and supervision of their firm's environmental protection strategies;

- for specialized technicians, career development may be seen as progress from the "micro" to the "macro" level, i.e. from the operation of micro-systems to control over more complex systems. These occupations acquire a managerial character with their gradual progress from activities concerned with technical efficiency to those concerned with the optimization of economic factors. This progress calls for accumulated experience in various sectors (broadening of the specialized field) and the acquisition of inter-disciplinary skills in the technical and economic spheres;

- career development for operational personnel involves an increasing level of complexity in the tasks performed, the acquisition of greater autonomy in decision-making and a move closer to the sphere of the technician through contributions to the improvement of the results achieved. Advancement is obtained through coordination and supervision activities requiring a better knowledge of the company's production system and the acquisition of inter-disciplinary skills aimed at the improvement of the results - also taking profitability into account.

This sector - safety and environmental protection in industry - has developed substantially in the past few years as a result of the significance accorded to it by recent legislation. The diversity of the organizational structures adopted by the various firms under study is due to historical factors and the objectives and characteristics of the firms themselves. This raises problems in mapping career development; however, on the basis of information elicited in the course of the survey it is possible to trace certain routes to advancement, although we are aware that these are not of general application.

CAREER DEVELOPMENT



SURVEY QUESTIONNAIRE

A. DETAILS OF FIRM

Registered business name .....

Firm or establishment .....

Location .....

Products .....

Markets (national, Community, international) .....

Total number of employees ..... of which women .....

number of manual workers ..... educational level .....

number of technicians ..... educational level .....

number of managerial staff ..... educational level .....

number of white-collar workers ..... educational level .....

B. ORGANIZATION CHART

Draw a chart illustrating your firm's organizational structure

C. MANUFACTURING PROCESSES OR PRODUCTS INVOLVING ENVIRONMENTAL HAZARDS

1. Give a brief description of the manufacturing process for each product, the technologies used and the work organization (with details of working hours, shift work, night work, etc.).

Complete Table 1 on next page.

Instructions for completion of Table 1

(1) In the first column, describe the manufacturing process indicating the principal stages; if necessary use a flow chart.

(2) In the second column, give a brief description of your firm's activities, the technologies and raw materials used and the work organization, giving details of working hours, shift work and night work.

(3) The hazards indicated in the third column should relate to the following:

(a) raw materials (transport, storage)
(b) manufacturing processes (emissions and waste products, solid, liquid and gaseous)
(c) semi-finished products (transport, storage)
(d) finished products (storage, transport, user or consumer)
(e) sources of energy produced and used
(f) machinery and equipment used (noise, vibration, etc.)
(g) major accident hazards (with reference to the Seveso Directive)
(h) social effects
(i) other factors (specify).

(4) A brief evaluation of the hazards identified should be given in the fourth column, using the following symbols:

- NP - non-existent problem
- PR - problem resolved
- PN - problem not resolved
- PT - problem to be tackled.

For each potential hazard give an evaluation, on a scale of from 1 to 10, of the level of danger for the environment.

TABLE 1

DESCRIPTION OF MANUFACTURING PROCESS (1)	DESCRIPTION OF ACTIVITIES, TECHNOLOGIES AND WORK ORGANIZATION (2)	ENVIRONMENTAL HAZARDS (3)	EVALUATION (4)	
			Situation	Extent of danger

D. OCCUPATIONS

1. In relation to each potential source of danger, indicate the occupations concerned with preventive measures and environmental protection.

Complete Table 2.

TABLE 2

HAZARD	AREA CONCERNED				
	RESEARCH, INNOVATION AND PROBLEM-SOLVING	MONITORING AND SUPERVISION	ADJUSTMENT AND MAINTENANCE	TREATMENT AND PROCESSING	RELATIONS WITH OUTSIDE BODIES, ADMINISTRATIVE AND LEGAL MATTERS

2. In the occupations referred to in the table on the preceding page, what percentage of their working time do post-holders devote to the "specific field of activity"+? In other words, is this a full-time or supplementary (e.g., job enrichment) activity?

+ "Specific field of activity" means activities relating specifically to one of the hazards listed.

Occupation	Average % of working time

3. Are these occupations governed by specific provisions under contract or collective agreement?

YES NO

If so, these provisions derive from:

- a national collective agreement:

- a firm or group-level agreement:

4. For each of the occupations referred to, list the tasks performed, the skills and knowledge required, the denomination under contract or agreement, and the type and level of education (educational levels should refer to the European classification set out in the Annex).

Complete Table 3.

TABLE 3

OCCUPATION	TASKS	SKILLS AND COMPETENCES	DENOMINATION UNDER AGREEMENT OR CONTRACT	EDUCATION AND TRAINING LEVEL (WITH REF. TO EEC CLASSIFICATION)

5. Indicate the source and type of vocational training provision:

- educational level required (indicate the minimum required)

- in-firm or outside vocational training (indicate source of training)

- type of training (on-the-job, theoretical, practical, etc.)

- average duration of course

- indicate whether training is occasional or recurrent

- level of training (1, 2, 3, 4, 5) with reference to the EEC classification (see Annex)

Annex

TRAINING LEVELS (WITH REFERENCE TO EEC CLASSIFICATION)

LEVEL 1: compulsory schooling + vocational preparation.

Vocational preparation may be obtained within the school system or outside, or in firms. At this level, theoretical knowledge and practical skills are very limited, enabling the execution of relatively simple tasks which may be mastered rapidly.

LEVEL 2: compulsory education + vocational training (including, in particular, apprenticeship).

At this level, the trainee is fully qualified to exercise a well-defined activity and possesses the skills necessary to operate the equipment involved and employ the techniques necessary. This training level relates primarily to operational jobs which may entail a degree of autonomy within the limits of the techniques involved.

LEVEL 3: compulsory education and|or supplementary technical training or technical or other training at secondary school level.

At this level, trainees' theoretical knowledge is more advanced than at level 2. The related activities are primarily technical and may entail a degree of autonomy and|or other responsibilities such as planning and coordination.

LEVEL 4: secondary school and upper secondary school technical qualifications.

The specialized technical training required can be obtained inside or outside the school system. The trainee acquires knowledge and perspectives corresponding to an advanced level, although a mastery of the scientific principles underlying the various subjects is not required. These qualifications enable the holder to assume the tasks and responsibilities involving a conceptual activity (planning and|or administration and|or management).

LEVEL 5: upper secondary or upper secondary technical + higher education qualifications.

These qualifications enable the holder to exercise an occupation, whether as an employee or in a self-employed capacity, and entail the mastery of the fundamental principles involved. The qualifications required to exercise an occupation may be identified with other levels.

CEDEFOP — European Centre for the Development of Vocational Training

Occupational and qualification structures in the field of environmental protection in the metal and chemical industries in Italy

by Claudio Stanzani

CEDEFOP Document

Luxembourg: Office for Official Publications of the European Communities

1992 — V, 70 pp. — 21.0 x 29.7 cm

ISBN 92-826-2881-7

Catalogue number: HX-71-91-243-EN-C

Price (excluding VAT) in Luxembourg: ECU 7

Venta y suscripciones • Salg og abonnement • Verkauf und Abonnement • Πωλήσεις και συνδρομές
Sales and subscriptions • Vente et abonnements • Vendita e abbonamenti
Verkoop en abonnementen • Venda e assinaturas

BELGIQUE / BELGIË

Moniteur belge / Belgisch Staatsblad
Rue de Louvain 42 / Leuvenseweg 42
1000 Bruxelles / 1000 Brussel
Tél. (02) 512 00 26
Fax 511 01 84
CCP / Postrekening 000-2005502-27

Autres distributeurs / Overige verkooppunten

Librairie européenne/ Europese Boekhandel
Avenue Albert Jonnart 50 / Albert Jonnartlaan 50
1200 Bruxelles / 1200 Brussel
Tél. (02) 734 02 81
Fax 735 08 60

Jean De Lannoy
Avenue du Roi 202 / Koningslaan 202
1060 Bruxelles / 1060 Brussel
Tél. (02) 538 51 69
Telex 63220 UNBOOK B
Fax (02) 538 08 41

CREDOC
Rue de la Montagne 34 / Bergstraat 34
Bte 11 / Bus 11
1000 Bruxelles / 1000 Brussel

DANMARK

J. H. Schultz Information A/S
EF-Publikationer
Ottiliavej 18
2500 Valby
Tlf. 36 44 22 66
Fax 36 44 01 41
Girokonto 6 00 08 86

BR DEUTSCHLAND

Bundesanzeiger Verlag
Breite Straße
Postfach 10 80 06
5000 Köln 1
Tel. (02 21) 20 29-0
Telex ANZEIGER BONN 8 882 595
Fax 20 29 278

GREECE

G.C. Eleftheroudakis SA
International Bookstore
Nikis Street 4
10563 Athens
Tel. (01) 322 63 23
Telex 219410 ELEF
Fax 323 98 21

ESPAÑA

Boletín Oficial del Estado
Trafalgar, 27
28010 Madrid
Tel. (91) 44 82 135

Mundi-Prensa Libros, S.A.
Castelló, 37
28001 Madrid
Tel. (91) 431 33 99 (Libros)
431 32 22 (Suscripciones)
435 36 37 (Dirección)
Telex 49370-MPLI-E
Fax (91) 575 39 98

Sucursal
Librería Internacional AEDOS
Consejo de Ciento, 391
08009 Barcelona
Tel. (93) 301 86 15
Fax (93) 317 01 41

Librería de la Generalitat de Catalunya
Rambla dels Estudis, 118 (Palau Moja)
08002 Barcelona
Tel. (93) 302 68 35
302 64 62
Fax (93) 302 12 99

FRANCE

Journal officiel
Service des publications des Communautés européennes
26, rue Desaix
75727 Paris Cedex 15
Tél. (1) 40 58 75 00
Fax (1) 40 58 75 74

IRELAND

Government Publications Sales Office
Sun Alliance House
Molesworth Street
Dublin 2
Tel. (1) 71 03 09

or by post

Government Stationery Office
EEC Section
6th floor
Bishop Street
Dublin 8
Tel. (1) 78 16 66
Fax (1) 78 06 45

ITALIA

Licosa Spa
Via Benedetto Fortini, 120/10
Casella postale 552
50125 Firenze
Tel. (055) 64 54 15
Fax 64 12 57
Telex 570466 LICOSA I
CCP 343 509

Subagenti:

Libreria scientifica
Lucio de Biasio - AEIOU
Via Meravigli, 16
20123 Milano
Tel. (02) 80 76 79

Herder Editrice e Libreria
Piazza Montecitorio, 117-120
00186 Roma
Tel. (06) 679 46 28/679 53 04

Libreria giuridica
Via XII Ottobre, 172/R
16121 Genova
Tel. (010) 59 56 93

GRAND-DUCHÉ DE LUXEMBOURG

Messageries Paul Kraus
11, rue Christophe Plantin
2339 Luxembourg
Tél. 499 88 88
Télex 2515
Fax 499 88 84 44
CCP 49242-63

NEDERLAND

SDU Overheidsinformatie
Externe Fondsen
Postbus 20014
2500 EA 's-Gravenhage
Tel. (070) 37 89 911
Fax (070) 34 75 778

PORTUGAL

Imprensa Nacional
Casa da Moeda, EP
Rua D. Francisco Manuel de Melo, 5
1092 Lisboa Codex
Tel. (01) 69 34 14

Distribuidora de Livros Bertrand, Ltd.ª
Grupo Bertrand, SA
Rua das Terras dos Vales, 4-A
Apartado 37
2700 Amadora Codex
Tel. (01) 49 59 050
Telex 15798 BERDIS
Fax 49 60 255

UNITED KINGDOM

HMSO Books (PC 16)
HMSO Publications Centre
51 Nine Elms Lane
London SW8 5DR
Tel. (071) 873 2000
Fax GP3 873 8463
Telex 29 71 138

ÖSTERREICH

Manz'sche Verlags- und Unhversitätsbuchhandlung
Kohlmarkt 16
1014 Wien
Tel. (0222) 531 61-0
Telex 11 25 00 BOX A
Fax (0222) 531 61-81

SUOMI

Akateeminen Kirjakauppa
Keskuskatu 1
PO Box 128
00101 Helsinki
Tel. (0) 121 41
Fax (0) 121 44 41

NORGE

Narvesen information center
Bertrand Narvesens vei 2
PO Box 6125 Etterstad
0602 Oslo 6
Tel. (2) 57 33 00
Telex 79668 NIC N
Fax (2) 68 19 01

SVERIGE

BTJ
Box 200
22100 Lund
Tel. (046) 18 00 00
Fax (046) 18 01 25

SCHWEIZ / SUISSE / SVIZZERA

OSEC
Stampfenbachstraße 85
8035 Zürich
Tel. (01) 365 54 49
Fax (01) 365 54 11

ČESKOSLOVENSKO

NIS
Havelkova 22
13000 Praha 3
Tel. (02) 235 84 46
Fax 42-2-264775

MAGYARORSZÁG

Agroinform
Budapest I. Kir.
Attila út 93
1012 Budapest
Tel. (1) 56 82 11
Telex (22) 4717 AGINF H-61

POLAND

Business Foundation
ul. Krucza 38/42
00-512 Warszawa
Tel. (22) 21 99 93, 628-28-82
International Fax&Phone
(0-39) 12-00-77

YUGOSLAVIA

Privredni Vjesnik
Bulevar Lenjina 171/XIV
11070 Beograd
Tel. (11) 123 23 40

CYPRUS

Cyprus Chamber of Commerce and Industry
Chamber Building
38 Grivas Dhigenis Ave
3 Deligorgis Street
PO Box 1455
Nicosia
Tel. (2) 449500/462312
Fax (2) 458630

TURKIYE

Pres Gazete Kitap Dergi Pazarlama Değtim Ticaret ve sanayi AŞ
Narlibahçe Sokak N. 15
Istanbul-Cağaloğlu
Tel. (1) 520 92 96 - 528 55 66
Fax 520 64 57
Telex 23822 DSVO-TR

AUTRES PAYS
OTHER COUNTRIES
ANDERE LÄNDER

Office des publications officielles des Communautés européennes
2, rue Mercier
2985 Luxembourg
Tél. 49 92 81
Télex PUBOF LU 1324 b
Fax 48 85 73
CC bancaire BIL 8-109/6003/700

CANADA

Renouf Publishing Co. Ltd
Mail orders — Head Office
1294 Algoma Road
Ottawa, Ontario K1B 3W8
Tel. (613) 741 43 33
Fax (613) 741 54 39
Telex 0534783

Ottawa Store
61 Sparks Street
Tel. (613) 238 89 85

Toronto Store
211 Yonge Street
Tel. (416) 363 31 71

UNITED STATES OF AMERICA

UNIPUB
4611-F Assembly Drive
Lanham, MD 20706-4391
Tel. Toll Free (800) 274 4888
Fax (301) 459 0056

AUSTRALIA

Hunter Publications
58A Gipps Street
Collingwood
Victoria 3066

JAPAN

Kinokuniya Company Ltd
17-7 Shinjuku 3-Chome
Shinjuku-ku
Tokyo 160-91
Tel. (03) 3439-0121

Journal Department
PO Box 55 Chitose
Tokyo 156
Tel. (03) 3439-0124

BEST COPY AVAILABLE

European Centre for the Development of Vocational Training
Jean Monnet House, Bundesallee 22, **D-W-1000 Berlin 15**
Tel. (030) 88 41 20; Fax (030) 88 41 22 22; Telex 184 163 eucen d

CEDEFOP

04 05 16

HX-71-91-243-EN-C

Price (excluding VAT) in Luxembourg: ECU 7

ISBN 92-826-2881-7

OFFICE FOR OFFICIAL PUBLICATIONS
OF THE EUROPEAN COMMUNITIES
L-2985 Luxembourg

9 789282 628812

89